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Perioperative parenteral and enteral nutrition for patients undergoing orthotopic liver transplantation. Results of a questionnaire from 16 European transplant units

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Abstract The present clinical experience in perioperative nutrition for patients undergoing orthotopic liver transplantation was evaluated by a questionnaire, answered by 16/21 European transplant units (76.1 %). There is agreement, that malnutrition reflects per se the severity of chronic liver disease and should be not considered, in general, to exclude patients from the transplant waiting list. Most centers administer postoperative nutrition without difference to other patients after gastrointestinal major surgery. A combination of parenteral and enteral nutrition is preferred. Experience with preoperative nutritional support and use of new immunomodulating substances is rather limited.

Key words Liver transplantation
Perioperative nutrition

Introduction

For nutrition in liver disease and transplantation a consensus report of the European Society of Parenteral and Enteral Nutrition has been published recently [1]. Malnutrition is uncommon in patients transplanted for fulminant hepatic failure, whereas it is often observed in those suffering from advanced chronic liver disease. Poor nutritional state and hypermetabolism before transplantation may be predictive of increased postoperative morbidity and mortality [2–5]. For perioperative nutrition in patients undergoing liver transplantation not many recommendations can be based on data from controlled randomized studies. In order to evaluate clinical experience and routine of perioperative nutrition for liver transplantation in Europe, a questionnaire was designed.

Materials and methods

In July 1996, the questionnaire was sent to 21 liver transplant units in nine European countries which perform at least 40 liver transplants/year. Answers were received from 16 centers (76.1 %).

Results

Assessment of nutritional status

The nutritional status of transplant candidates is assessed by most centers (13/16). Most frequently, subjective global assessment (11/13) next to the measurement of body weight (13/13) and serum albumin (13/13) are used. Anthropometry (5/13) or the determination of serum levels of prealbumin (3/13), transferrin (2/13), retinol-binding globulin or immunglobulins (1/13) are reported less frequently. All centers agree that a bad nu-

tritional status reflects per se the severity of liver disease. There is no specific cut-off point for the exclusion of malnourished transplant candidates.

Strategies of nutrition

The majority of centers (11/16) do not have a formal pretransplant nutritional regimen, while 5/16 have a protocol for malnourished patients, 1 even for those with normal nutritional status. Postoperatively, 11/16 centers have a standardized nutritional regimen, while 5/16 prefer nutrition according to individual requirements. Parenteral and enteral nutrition is combined in 10/16 centers, while 3/16 either use the parenteral or the enteral route exclusively. A nasoduodenal or jejunal tube is used in 10/16 centers and 2/16 centers routinely perform fine-needle catheter jejunostomy during transplantation.

Nutrient requirements and supply

In most instances energy requirements are estimated by clinical experience (13/16); only 5/16 calculate resting energy expenditure (REE) by equations such as those of Harris Benedict or others. In 4/16 centers REE is measured by indirect calorimetry and energy requirements are calculated using a factor of 1.2–1.3. In 11/16 centers 30–35 kcal/kg body weight is considered an adequate energy intake with a range from 10 up to 45 kcal/kg body weight. A composition of non-protein calories with a ratio of 60–65% glucose/35–40% fat, range from 40/60% up to 80/20%, is preferred in 6/16 centers. For parenteral nutrition, amino acid solutions enriched with branched-chain amino acids (BCAA) are used by 8/16 centers; by 3 of them in all patients and by 5 only in cases of impaired graft function according to clinical signs of encephalopathy (3/16), hyperammonemia (1/16), or aminoacidogram (1/16). Fat is given by most centers (10/16) using medium-chain triglycerides (MCT) as MCT/long-chain triglyceride (LCT) emulsions. In 4/16 centers, LCT are preferred and 2/16 centers do not use any fat for parenteral nutrition. Micronutrients are supplied in general by 12/16 centers and by 2 only in cases of total parenteral nutrition. Vitamins are administered by 9/16 centers and 6 additionally give trace elements. In liver transplant patients, experience with new substrates for clinical nutrition is limited: glutamine (4/16), arginine (4/16), ornithine (1/16), and omega-3 fatty acids (3/16). Five of the 16 centers (2 of those with experience) are concerned about the potential influence on graft rejection and 1/16 stopped using them due to the considerable costs.

Duration and monitoring of nutrition

Nutritional support will be usually administered for 3–5 days (5/16); range from 2–3 up to 15–20 days. Whenever possible, oral feeding will be started on postoperative day (pod) 2–4 (7/16); range from 1–2 up to 5–7 days. According to the type of bile duct anastomosis, the nutritional regimen is modified (10/16). In cases of Roux-en-Y anastomosis nutrition is exclusively administered by the parenteral route and oral feeding is started no earlier than pod 5 or 6 (10/16). Tolerance of enteral feeding is monitored predominantly by clinical observation of the patient (14/16); criteria are abdominal distension (12/16), gastric emptying and nausea (6/16), diarrhea (5/16), and respiratory function (1/16). Adequate substrate utilization and metabolic response is addressed by laboratory parameters such as serum glucose (13/16), serum triglycerides (12/16), urea (12/16), serum albumin (5/16), urine urea excretion (4/16), serum prealbumin (3/16), or even serum levels of transferrin, ammonia, coeruloplasmin, and retinol-binding globulin (each 1/16). Glucose intolerance in preoperatively nondiabetic patients in the early posttransplant period is managed by reduction of glucose administration (5/16) and in most centers (14/16) by insulin. Hyperglycemia is tolerated up to a serum level of 180–200 mg% (7/16) and even up to 250–300 mg% (3/16).

Discussion

The few controlled studies on nutritional interventions in patients undergoing liver transplantation have focused on the postoperative period. Only one study investigated the effect of pretransplant nutrition in children [6]. BCAA supplementation proved to be advantageous with regard to growth in terms of height and body weight [6]. The value of postoperative parenteral nutrition could be demonstrated in terms of less time on a ventilator and in the intensive care unit [7]. Regarding BCAA-enriched solutions, no additional benefits were observed, compared to conventional amino acid solutions. Hasse et al. [8] investigated early enteral nutrition starting 12 h after transplantation and found significantly fewer viral infections and better nitrogen retention in the enterally fed patients. Wicks et al. [9] did not find a difference between enteral and parenteral nutrition with regard to provision of nutrients and nutritional status on pod 10 which is also an argument for the enteral route from a cost benefit point of view. The feasibility of jejunostomy tubes placed at the time of transplantation was shown by Pescowitz et al. [10]. According to the clinical experience of European transplant centers, nutritional status is assessed in transplant candidates without defined exclusion criteria. There is no larger experience with standardized pretransplant nutritional

support. The centers agree about the indication for nutritional support after transplantation and, whenever possible, the enteral route is preferred. According to the recommendations [1], most centers administer normocaloric nutrition, while some centers prefer hyper- and others more hypocaloric feeding. With regard to non-protein calories and glucose/fat ratio, clinical routine is in agreement with general and recent recommendations for surgical patients [11, 12], in cases of adequate graft function without specific modifications such as the use of enriched BCAA amino acid solutions. At present, there is only limited experience with supplemented nutrition by new substrates such as glutamine, arginine, and omega-3 fatty acids. Despite potential benefits with regard to morbidity and septic complications, adverse effects on graft rejection cannot be excluded. In order to elucidate the influence of appropriate nutritional support on perioperative metabolism and outcome in liver transplantation, further and better designed clinical trials are required.

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