

Gastroenterology – Guidelines on Parenteral Nutrition, Chapter 15

Gastroenterologie – Leitlinie Parenterale Ernährung, Kapitel 15

Abstract

In patients with Crohn's disease and ulcerative colitis parenteral nutrition (PN) is indicated when enteral nutrition is not possible or should be avoided for medical reasons. In Crohn's patients PN is indicated when there are signs/symptoms of ileus or subileus in the small intestine, scars or intestinal fistulae. PN requires no specific compounding for chronic inflammatory bowel diseases. In both diseases it should be composed of 55–60% carbohydrates, 25–30% lipids and 10–15% amino acids. PN helps in the correction of malnutrition, particularly the intake of energy, minerals, trace elements, deficiency of calcium, vitamin D, folic acid, vitamin B12, and zinc. Enteral nutrition is clearly superior to PN in severe, acute pancreatitis. An intolerance to enteral nutrition results in an indication for total PN in complications such as pseudocysts, intestinal and pancreatic fistulae, and pancreatic abscesses or pancreatic ascites. If enteral nutrition is not possible, PN is recommended, at the earliest, 5 days after admission to the hospital. TPN should not be routinely administered in mild acute pancreatitis or nil by mouth status <7 days, due to high costs and an increased risk of infection. The energy requirements are between 25 and 35 kcal/kg body weight/day. A standard solution including lipids (monitoring triglyceride levels!) can be administered in acute pancreatitis. Glucose (max. 4–5 g/kg body weight/day) and amino acids (about 1.2–1.5 g/kg body weight/day) should be administered and the additional enrichment of TPN with glutamine should be considered in severe, progressive forms of pancreatitis.

Keywords: inflammatory bowel disease, Crohn's disease, ulcerative colitis, pancreatitis

Zusammenfassung

Eine parenterale Ernährung (PE) ist indiziert bei Patienten mit Morbus Crohn oder Colitis ulcerosa, wenn eine enterale Ernährung nicht möglich ist bzw. aus medizinischen Gründen vermieden werden sollte. Bei Morbus Crohn Patienten kann eine PE bei Manifestation im oberen Dünndarm und Ileus- und Subileusymptomatik, Narben oder Darmfisteln indiziert sein. Die PE bedarf keiner speziellen Zusammensetzung für chronisch entzündliche Darmerkrankungen. In beiden Erkrankungen sollte sich die PE aus 55–60% Kohlenhydraten, 25–30% Fett und 10–15% Aminosäuren zusammensetzen. Die PE unterstützt die Korrektur der Mangelernährung, vor allem die Aufnahme von Energie, Mineralstoffen, Spurenelementen, Mangel an Kalzium, Vitamin D, Folsäure, Vitamin B 12, Zink. Im Falle einer notwendigen künstlichen Ernährung bei einer schweren akuten Pankreatitis ist eine enterale Ernährung einer parenteralen Ernährungsform eindeutig überlegen. Eine Unverträglichkeit der enteralen Ernährung führt bei Komplikationen, wie Pseudozysten, intestinale und pankreatische Fisteln, pankreatische Abszesse oder pankreatischem Aszites zum Einsatz der TPE. Sollte eine enterale Ernährung nicht möglich sein, ist eine PE erst nach frühestens 5 Tagen nach Klinikeintreffen zu empfehlen. Die TPE sollte bei milder akuter

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Pankreatitis, Nahrungskarenz <7 Tage, nicht routinemäßig verabreicht werden, aufgrund steigender Kosten und erhöhtem Infektionsrisiko. Der Energiebedarf liegt zwischen 25 und 35 kcal/kg KG/Tag. Bei akuter Pankreatitis kann eine Standardlösung inklusive Fett verabreicht werden (Monitoring der Triglyzeridspiegel!).

Glukose von max. 3–6 g/kg KG/Tag und Aminosäuren von 1,2–1,5 g/kg KG/Tag sollten zugeführt werden sowie eine zusätzliche Anreicherung durch Glutamin von TPE sollte bei schweren Verlaufsformen einer Pankreatitis erwogen werden.

Schlüsselwörter: chronisch entzündliche Darmerkrankungen, Morbus Crohn, Colitis ulcerosa, Pankreatitis

Crohn's disease

Indication and time of parenteral nutrition (PN)

- PN is indicated when enteral nutrition is not possible or should be avoided for medical reasons (A).
- PN is indicated when there are signs/symptoms of ileus or subileus in the small intestine, scars or intestinal fistulae (C).

Substrate intake

- PN requires no specific compounding for chronic inflammatory bowel diseases.
- It should be composed of 55–60% carbohydrates, 25–30% lipids and 10–15% amino acids (A). No conclusive data is available on the use of admixtures in the form of polyunsaturated fatty acids (C).
- PN helps in the correction of malnutrition, particularly the intake of energy, minerals, trace elements, deficiency of calcium, vitamin D, folic acid, vitamin B12, and zinc (A).

Commentary

Once the use of PN has been decided upon, a PN solution should be used due to the high incidence of malnutrition in chronic inflammatory bowel disease. PN should be administered via central venous access for osmolarity over 800 mosmol/l and continuously over 24 hours.

The daily parenteral energy intake in well-nourished adult patients should amount to 25–30 kcal/kg body weight. During the first 24–48 hours, the PN administration should be slowly started with a phase of an “up-titration”, starting with about 50% of the energy amount. The volume should be adjusted to 30–40 ml/kg body weight, depending on the loss of fluid. Concentrations of 4–6 g glucose/kg body weight, 1.5–2 g lipids per kg body weight and 1.5–2 g amino acids per kg body weight are recommended [1].

PN is indicated in cases of toxic megacolon, malabsorption syndrome, particularly short bowel syndrome, insufficient growth and disturbance of growth in children as

well as when enteral nutrition is not tolerated [2], [3], [4], [5], [6], [7], [8], [9], [10].

PN presents no advantage if the disease is chronically active (A). An increased rate of remission is not achieved with PN, according to the official recommendations of the American Gastroenterological Association (AGA). PN has no influence on the surgical intervention rate. According to these recommendations, it is not necessary to bypass the intestinal passage to attain clinical remission. An optimal supply of nutrients improves bowel motility, intestinal permeability and nutritional status, and lowers inflammatory reactions [8], [11]. Malnutrition often occurs in patients with inflammatory bowel diseases. There are extensive differences in the parameters for malnutrition between Crohn's disease and ulcerative colitis. Malnutrition is diagnosed in 80% of Crohn's disease patients [5], [9], [10], [11]. The severity of malnutrition depends on the duration of the illness, activity of the inflammation, the function of the small intestine and extent of the diseased sections in the small intestine, and results in a higher incidence of protein energy malnutrition as well as specific substrate deficiency.

Clinical symptoms, inflammatory and nutritional parameters in Crohn's disease can improve under enteral/oral nutrition [2], [6], [10], [12], [13], [14]. There is no standardised data available regarding the remission rate with PN. It was found that in complicated cases, remission could be more easily attained through PN than with enteral nutrition [15].

Total PN is an important therapy in children and teenagers [5].

In terms of wound healing and reconstitution of the small intestine, PN shows no advantages as compared to enteral nutrition. It is assumed that oral/enteral nutrition provides faster stability in organ function of the small intestine.

Complications like venous thromboses, occlusion of the central venous vessels, sepsis, cholestasis/cholangitis/cholecystitis, cholestatic liver dysfunction are associated with TPN [16], [17], [18], [19], [20], [21], [22], [23], [24], [25], [26], [27]. Acute elevation in transaminases, overall bilirubin and albumin are characteristics of PN metabolic complications [16], [17], [18], [19], [20], [21], [22], [24], [25].

Numerous studies show that catheter-related sepsis occur on an average once or twice every two years in patients

on long-term PN who are suffering from a functional short bowel syndrome, as a result of chronic inflammatory bowel diseases. Recurring catheter infections with septic components occur during hospital stays in dependence of central access catheter models and in dependence of training and care standards in the hospital in patients who are not receiving long-term PN [28]. There are no advantages of PN therapy over enteral nutrition therapy regarding fistula healing. No differences can be seen in the rate of survival.

Ulcerative colitis

Indication and time of PN

- PN is indicated when enteral nutrition is not possible or should be avoided for medical reasons (A).

Substrate intake

- PN requires no specific compounding for chronic inflammatory bowel diseases (A).
- It should be composed of 55–60% carbohydrates, 25–30% lipids and 10–15% amino acids (A). No conclusive data is available on the use of admixtures in the form of polyunsaturated fatty acids (C).
- PN helps in the correction of malnutrition, particularly the intake of energy, minerals, trace elements, deficiency of calcium, vitamin D, folic acid, vitamin B12, and zinc (A). In addition, the intake of vitamins, trace elements and minerals can be orally or intravenously substituted irrespective of PN.

Commentary

No significant improvement in clinical parameters was observed in patients with ulcerative colitis with the use of PN [2], [29]. There is no standardised data available regarding the remission rate with PN. It was also observed that, in complicated cases, remission could be more easily attained with PN than with enteral nutrition [15]. Total PN is an important therapy in children and teenagers [5].

In terms of wound healing and the reconstitution of the small intestine, PN shows no advantages compared to enteral nutrition. It is assumed that oral/enteral nutrition provides faster stability in organ function of the small intestine.

Complications like venous thrombosis, occlusion of the central venous vessels, sepsis, cholestasis/cholangitis/cholecystitis, cholestatic liver dysfunction are associated with TPN [16], [17], [19], [20], [21], [22], [24], [25], [30].

Acute increase in transaminases, overall bilirubin and albumin are characteristics of metabolic complications of PN [16], [17], [19], [20], [21], [22], [24], [25], [30].

There are no advantages of PN therapy over enteral nutrition therapy regarding fistula healing. No differences can be seen in the rate of survival.

Acute pancreatitis

Indication and time of PN

- Enteral nutrition is clearly superior to PN in severe, acute pancreatitis (A).
- An intolerance to enteral nutrition results in an indication for total PN in complications such as pseudocysts, intestinal and pancreatic fistulae, and pancreatic abscesses or pancreatic ascites (B).
- If enteral nutrition is not possible, PN is recommended, at the earliest, 5 days after admission to the hospital (C).
- TPN should not be routinely administered in mild acute pancreatitis or nil by mouth status <7 days, due to high costs and an increased risk of infection (C).

Commentary

The nutritional therapy of acute pancreatitis depends on the severity of the disease, presence of any complications and nutritional state of the patient. Enteral transduodenal feeding should be started once acute pancreatitis is suspected. There is a clear benefit with enteral nutrition in numerous studies [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41] regarding LOS, infection-related morbidity and possible organ failures. Total PN should be started only when there are contraindications to enteral nutrition or no possible access.

The time to start should be after the resolution of the acute phase in acute, complicated forms of pancreatitis [42], [43]. A prospective, controlled and randomised study on acute pancreatitis [44] shows that exclusive TPN results in a longer LOS and increase in costs with no improvement regarding the course of disease.

Recent studies have shown that enteral nutrition through a jejunal tube can be of an advantage in specific patient groups [45], [46], [47], [48]. A similarly positive effect is also achieved by using nasogastric tubes, but in a smaller study [49].

Jejunal feeding is assessed to be safe and effective in the postoperative stage in severe forms of pancreatitis, according to the study by Pupelis [45]. TPN is presumed to prevent stimulation of the exocrine pancreas as well as help in the maintenance of metabolic homeostasis in severe forms of pancreatitis [17], [30]. In severe cases (presence of ileus), the task of TPN is to compensate for the increased protein expenditure, as well as to maintain the nutrition state of the patient. PN reduces mortality and improves the nutritional situation in such circumstances [50], [51], and is to be continued until a stable, haemodynamic state is achieved [52], [53].

The lack of utilisation of the intestine in acute pancreatitis seems to worsen the metabolic stress situation, lengthen

the LOS and increase the risk of complications [31], [34], [40], [46], [54], [55]. Further evidence indicates that not only enteral nutrition, but also specific nutritional components in enteral nutrition such as probiotics, arginine, glutamine and antioxidants have a positive influence on LOS and the rate of complications [56], [57].

Energy intake

- The energy requirements lie in a range between 25 and 35 kcal/kg body weight/day [16] (A).

Substrate intake

- A standard solution including lipids can be administered in acute pancreatitis (C). Lipids can be administered to meet energy requirements and should be subject to regular monitoring (triglycerides).
- Carbohydrates are the most important energy source. Glucose administration (max. 4–5 g/kg body weight/day) counteracts intrinsic gluconeogenesis, and prevents protein degradation. Administering glucose instead of lipids, as an energy supplier, lowers the potential risk of hyperlipidemia, but lipid administration cannot be avoided in most cases (B).
- An even nitrogen balance can be achieved and maintained with amino acids. The intake of amino acids should be about 1.2–1.5 g/kg body weight/day (A).
- The additional enrichment of TPN with glutamine should be considered in severe, progressive forms of pancreatitis, thereby improving the clinical progression (B).
- The intravenous administration of lipid emulsions is safe, as long as triglyceride levels (<400 mg/dl) are monitored (C). Statements on particularly beneficial fatty acid admixtures cannot be made regarding pancreatitis.

Commentary

McClave et al. [44] carried out a study in 1997, in which 30 patients received either total PN or total enteral nutrition. No differences between the two groups were observed with regards to mortality, level of pain in the period until amylase levels normalised, serum albumin levels and the frequency of nosocomial infections. Significantly more hyperglycaemia occurred in the total PN group [34]. Tests on fatty acid admixtures are at present only available for “Intralipid” solutions and are deemed safe for administration [58].

The glucose admixture was modified in 2 studies [58], [59] based on the clinical picture of stress-induced hyperglycaemia. In the study carried out by Wu [58], initial hyperglycaemia was reported in 64% of patients, which was easier to control with a lipid/glucose admixture than in a pure glucose admixture. Hypertriglyceridemia, or negative effects on the liver function, were not reported. Significant differences regarding the glucose levels,

cholesterol levels or uric acid levels were also not reported in Martinez' work [59].

De Beaux et al. [60] carried out a study of 14 patients with acute pancreatitis, where one group received standardised PN and the other group received nutrition enriched with glutamine. The glutamine group showed increased lymphocyte proliferation, an increase in T-cell DNA as well as a drop in an interleukin 8 concentration. The administration of glutamine could be beneficial in preventing complications. A lower rate of complications and significantly lower rates of pancreatic infections were also described with glutamine in the papers by Ockenga et al. [61] and Xian et al. [62]. Patients with acute pancreatitis show an increased rate of catheter-sepsis and metabolic dysfunctions. The administration of thiamine, folic acid, magnesium and zinc is recommended in patients with a history of alcohol abuse [17], [63]. Patients with severe diseases and complications require early enteral nutritional therapy to prevent detrimental effects caused by nutritional losses (especially proteins) [32], [36], [64]. Some authors recommend early jejunal nutrition with an elementary diet and others recommend TPN combined with enteral nutrition [65]. PN should only be used in complicated cases when ileus is present or probable with regular checks for glucose, triglycerides and serum pH.

Notes

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