

Parenteral Nutrition Better than Enteral Nutrition in Pediatric Intensive Care Unit (PICU)?

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Summary

We collected 121 critically ill patients (1 month – 18 years old) from January 2003 to December 2003 who received nutritional support. *Results:* Total Parenteral Nutrition (TPN) was more frequently indicated in gastrointestinal tract diseases while Enteral Nutrition (EN) were mainly indicated in respiratory and neurological diseases. There were not significant differences in the weight at the entry Vs at the exit (EN $p=0.836$; TPN $p=0.737$). Albumin improved with EN but not with TPN. The lymphocyte count improved significantly in both groups (TPN $p= 0.042$; EN $p= 0.036$). There were a greater number of metabolic complications with TPN. The mortality was higher in TPN. *Conclusion:* Our nutritional intervention does not modified the weight but it improved the levels of absolute lymphocytes. EN and TPN are appropriate.

Introduction

Infants and children are a population highly susceptible to metabolic abnormalities when they have a disease that requires intensive care unit.

Enteral and/or parenteral nutritional support can mitigate these deficits and improve the clinical and biochemical responses but these have not been enough studied in pediatric patients critically ill. The aims of this study were to

determine the main outcomes of enteral or parenteral nutritional support in pediatric patients critically ill, to compare the clinical and biochemical parameters in children that received total parenteral nutrition (TPN) and the ones with enteral nutrition (EN) and to describe the complications in each group.

Material and methods

271 patients between 1 month and 18 years old were hospitalized for different causes in our Pediatric Intensive Care Unit (PICU) from January 2003 to December 2003 of which 121 patients received PN or EN as nutritional support. A protocol of laboratory tests (complete blood count, BUN, creatinine, total protein, albumin, electrolytes, liver markers, cholesterol and triglycerides) was performed on admission to nutritional support which are repeated regularly because they basic conditions. Anyway, at the end of nutritional support was made the same protocol of laboratory tests as a final check.

We collected the data from the files of the nutritional support team (NST) which consist in a format containing the clinical and biochemical data as well as daily nutritional recommendations for each patient. We analyzed: type of nutritional support, age, gender, weight, diagnostic, access for nutritional support, kind of complications (metabolic, infectious), lymphocyte count, albumin and other biochemical tests (potassium, sodium, magnesium, phosphorus, triglycerides and cholesterol), duration of nutritional support.

Patients were registered in a database in Excel, then designed a form in Epi Info and SPSS. The statistics analysis was performed using absolute frequencies, percentages (%), mean and standard deviation (SD), independent t and paired t with a $P < 0.05$ and CI of 95%.

Results

Of the 121 patients, 53.3% were male and 47.7% female, with ages between 1 month to 17 years old. 56 patients received TPN and 65 with enteral

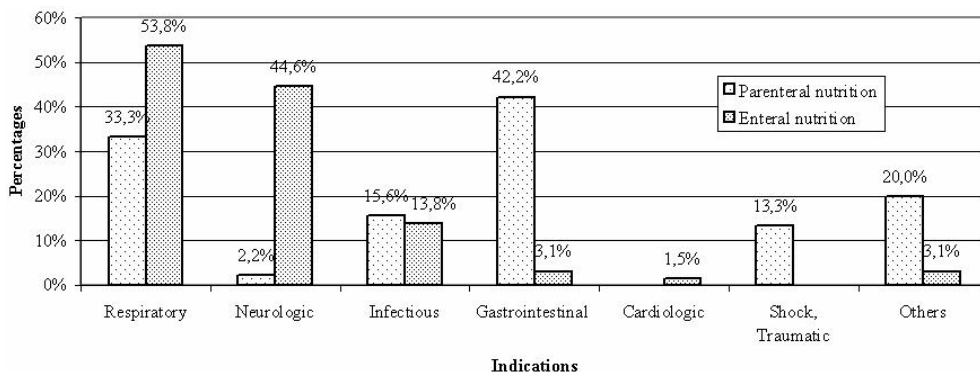


Figure Nº 1. Main indications for nutritional support (EN or PN) in PIUC, Clínica del Niño Previandes, 2003

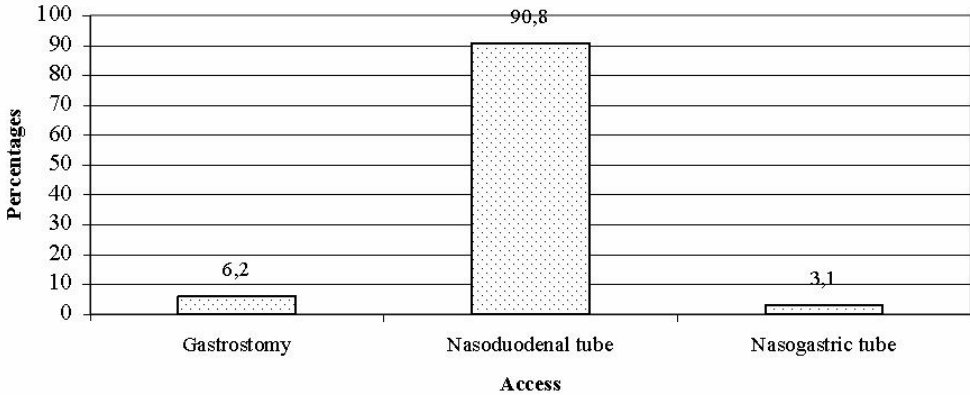


Figure N° 2. Access used for enteral nutrition (n=65) in PIUC; Clinica del Niño Previandes, 2003

nutrition (EN). The indications for TPN were mostly gastrointestinal tract diseases and their complications (42%) while the EN was mainly indicated in patients with respiratory (54%) and neurological (45%) diseases (figure 1).

The central venous access (97%) was the most used in the TPN and the naso-duodenal tract (91%) in patients with EN (Figure N° 2).

The most frequently delivery of EN was mixed, continuous initially and after in bolus, as shown in the Figure N° 3.

Comparing both groups (Table N°1), we observed that neither of them had significant differences in the weight at the entry or the weight at the exit (EN $p = 0.836$; TPN $p = 0.737$). The values of albumin in the EN group improved, but not in the TPN group.

The lymphocyte count at the exit vs. the lymphocyte count at the beginning improved significantly in TPN ($p= 0.042$ t paired) as in EN ($p= 0.036$ t paired) but there was not significant difference when comparing the two types

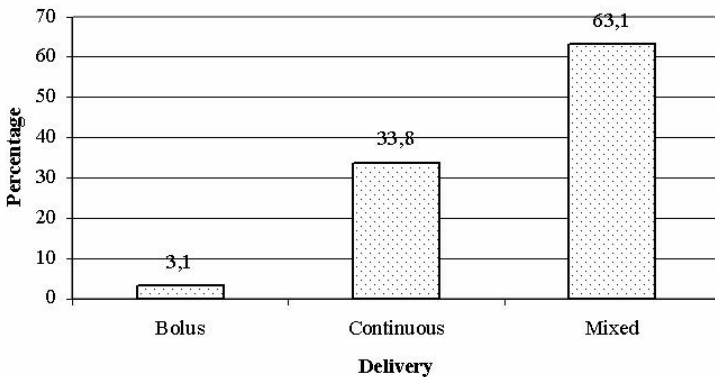


Figure N° 3. Delivery of enteral nutrition (n=65) in PIUC; Clinica del Niño Previandes, 2003

Table N° 1. Comparison between some outcomes of Parenteral Nutrition and Enteral Nutrition, patients in PIUC; Clinica del Niño-Previandes, 2003

| Variable | Parenteral nutrition n= 56 | Enteral Nutrition n= 65 | P |
|------------------------------------|-------------------------------|----------------------------|----|
| Duration | 7 +/- 5.5 days | 10 +/- 8.5 days | NS |
| Hipoalbuminemia (Entry vs Exit) | 67% vs 33% | 79% vs 65% | NS |
| Lymphocytes (Entry vs Exit) | p=0.042 | p=0.036 | NS |
| Weigth (Entry vs Exit) | p=0.737 | p=0.836 | NS |

NS= Not significance

of nutritional support (entry p = 0.633; exit p = 0.24) (Table N°1).

Metabolic complications were presented in both groups (TPN and EN) but we observed major percentages of hyponatremia, hyperkalemia, hypokalemia, hyperglycemia, hypercholesterolemia and hypertriglyceridemia in patients with TPN.

The average duration of EN was 10 days (DE +/- 8.5) and 7 days (DE +/- 5.5) in patients with TPN. At last, the mortality was of 11% in the EN vs. 32% in the TPN group.

Table N° 2. Complications of the Parenteral Nutrition and Enteral Nutrition, patients in PIUC; Clinica del Niño- Previandes, 2003.

| Complication | Parenteral nutrition | Enteral Nutrition |
|----------------------|----------------------|-------------------|
| | % | % |
| Hypokalemia | 25.5 | 37.5 |
| Hyponatremia | 25.5 | 31.3 |
| Hypertriglyceridemia | 25.5 | 12.5 |
| Cholestasis | 14.9 | - |
| Hyperglycemia | 19.1 | 6.3 |
| Hyperkalemia | 19.1 | 6.3 |
| Thrombocytopenia | 19.1 | - |
| Hypocalcemia | 17 | - |
| Hypercholesterolemia | 10.6 | 6.3 |
| Hypernatremia | 6.4 | 6.3 |
| Hypermagnesemia | 4.3 | - |
| Hypophosphatemia | 4.3 | - |
| Hypoglycemia | 2.1 | 6.3 |
| Hyperphosphatemia | 2.1 | - |
| | n= 56 | n= 65 |

Conclusion

Our study demonstrated that the nutritional intervention of NST no changed significantly the weight of pediatric patients critically ill, independent from the implementation way (EN or TPN) but it improved the levels of absolute lymphocytes for both groups (EN and TPN). Both EN and TPN are appropriate, however, EN support presents less metabolic complications. Nevertheless, it is so important to have a nutritional support team in the hospital, to minimize the metabolic and infectious complications in that kind of patients.

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