

Total Parenteral Nutrition – Associated Cholestasis (TPNAC) in Newborns

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Summary

We included 905 newborns (NB) from neonatal intensive care unit from January 1998 to December 2005 who received TPN. *Results:* 24 NB (2,7%) had TPNAC. At the beginning of TPNAC, the TPN duration was $17\pm 8,6$ days. TPNAC occurred mainly in NB with congenital malformations in gastrointestinal tract (36%), sepsis (20%), necrotizing enterocolitis (NEC) in 16% and perinatal asphyxia (12%). *Pseudomonas aeruginosa* was the main isolated microorganisms. *Conclusions:* Our data suggest that the NB more susceptible to TPNAC are those with congenital malformations in gastrointestinal tract, sepsis and NEC. The low percentage of TPNAC we found might correspond to a suitable following by Nutritional Support Team (NST), prescription according to the individual conditions and the use of both aminoacid and lipids adapted for NB.

Introduction

TPNAC commonly occurs in very low birth weight infants (VLBW). VLBW generally have a good response to TPN withdrawal and full enteral feeding but some of them can develop cirrosis and liver failure.

We have a Nutritional Support Team (NST) in Clinica del Niño, which is an interdisciplinary group well established since 1996 so the aim of this study was to determine how many newborns with TPN in a Hospital of reference in Colombia had TPNAC when specific aminoacids are used in the TPN, that is because data about it does not exist in Colombia.

Material and methods

A total of 905 newborn hospitalized in neonatal intensive care unit (NICU) between January 1998 and December 2005 and received TPN from different causes were included to find TPNAC cases in a descriptive and retrospective study.

NST wrote daily in the patient's clinical record clinical and biochemical data and the nutritional recommendations. Patients received TPN must have a protocol of laboratory tests including complete blood count, BUN, creatinine, electrolytes, liver markers, cholesterol and triglycerides, the first day of TPN and repeated at 7 day. Aminoacids solutions containing cysteine, tyrosine and taurine were used in PNT. Lipids solutions 20% (50% MCT – 50% LCT) were used in PTN.

Cholestasis was established according to levels of direct bilirubin greater than 2 mg % or direct bilirubin greater than 30% of total bilirubin.

Data were collected from the files of NST and medical records of newborns who received TPN. We collected clinical and biochemical data such as gestational age, age, gender, days with parenteral nutrition, nutrients inputs, days with parenteral nutritional at the moment of the diagnosis of cholestasis, nutritional recommendations, medical history, associated diseases, surgical treatment, Aspartate aminotransferase (AST), Alanine transaminase (ALT), alkaline phosphatase (ALP), bilirubin and blood cultures.

Data from patients were registered in a database in Excel, designed a form in Epi Info 6.04D and the statistics analysis was performed using absolute frequencies, percentages (%), mean and standard deviation (SD).

Results

Of 905 newborn hospitalized a total of 24 newborns (2,7%) had TPNAC (14 females and 10 males). Gestational age at birth was in average 35 weeks +/- 5 SD.

The values of the biochemical tests at the moment of TPNAC were: direct bilirubin of 4.3 mg% +/- 2 SD; ALT: 67.7 UI +/- 50 SD; AST: 71 UI +/- 67 SD; ALP: 255.3 UI +/- 120,5 SD (Table 1). Cholestasis was diagnosed when TPN's duration was in average 17 +/- 8,6 days.

At the beginning of TPNAC the nutrients intake were: protein 2.2 g/kg +/- 0.96 SD; fat 1.6 g/kg +/- 1.02 SD and carbohydrates 10.6 g/kg +/- 2.9. On the other hand, cholestasis occurred mainly in patients with some associated

Table N° 1 Biochemical parameters

Biochemical parameters	Mean	SD
Direct bilirubin	4.3	2
ALT	67.7	50
AST	71	67
ALP	255.3	120.5

Table N°2 Associated diseases in patients with cholestasis by PN.

Associated diseases	n	%
Duodenal atresia	1	4
Esophageal atresia	3	12
Intestinal volvulus	1	4
Necrotizing enterocolitis (NEC) 3 rd degree	4	16
Diaphragmatic hernia	2	8
Intestinal obstruction	2	8
Cystic fibrosis	1	4
Perinatal asphyxia	3	12
Hyalin membrane disease	2	8
Persistent arterious ductus with pulmonary hypertension	1	4
Sepsis	5	20
Total	25	100%

diseases such as congenital malformations in gastrointestinal tract in 36% (duodenal atresia, esophageal atresia, intestinal volvulus, diaphragmatic hernia, intestinal obstruction) due to sepsis (20%), necrotizing enterocolitis (NEC) in 16% and perinatal asphyxia in 12% (Table 2).

As could see, sepsis was one of the first associated situation to cholestasis and one of the main isolated microorganisms was *Pseudomona aeruginosa* in 32% of patients (Figure 1).

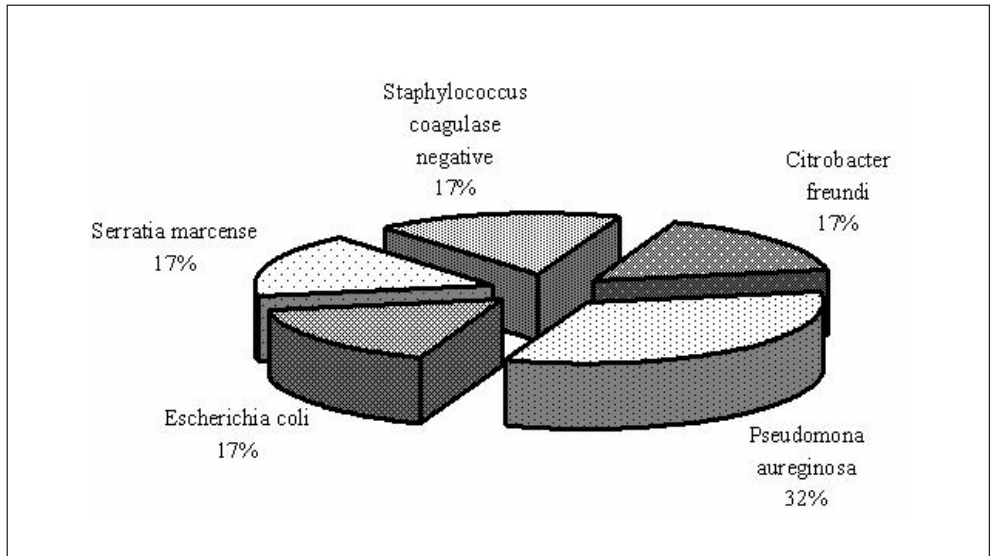


Figure N° 1. Isolated microorganisms in patients with sepsis & cholestasis by T

The treatment by NST was: suspended TPN in 4 cases because patients tolerated part of enteral nutrition, reduce the input of protein in 5 cases, decrease the input of fat in 6 cases, reduce the input of carbohydrate in 1 case and other patients TPN remained unchanged.

Conclusions

Our series data suggest that the newborns more susceptible to TPNAC are those with congenital malformations in gastrointestinal tract, sepsis and serious diseases as hialin membran disease and NEC. The low percentage of TPNAC we found might correspond to several factors such as a suitable following of patients by NST, individual prescription according to the clinical and biochemical conditions and also the use of both aminoacid and lipids adapted for newborns

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