Current Literature

Contributing Editor—Debra S. Kovacevich, RN, MPH
HomeMed, University of Michigan, Ann Arbor

Total Parenteral Nutrition in the Surgical Patient: A Meta-analysis

DK Heyland, M Montalvo, S MacDonald, et al
Department of Medicine, Queen's University, Kingston, Ontario, Canada

ABSTRACT: *Objective:* To examine the relationship between total parenteral nutrition (TPN) and complication and death rates in surgical patients. *Data Sources*: A computer search of published research on MEDLINE, personal files and a review of relevant reference lists. *Study Selection*: A review of 237 titles, abstracts or papers. Primary studies were included if they were randomized clinical trials of surgical patients that evaluated the effect of TPN (compared to no TPN or standard care) on complication and death rates. Studies comparing TPN to enteral nutrition (EN) were excluded. *Data Extraction:* Relevant data were abstracted on the methodology and outcomes of primary studies. Data were independently abstracted in duplicate. *Data Synthesis*: There were 27 randomized trials in surgical patients that compared the use of TPN to standard care (usual oral diet plus intravenous dextrose). When the results of these trials were aggregated, there was no effect on mortality (risk ratio = 0.97, 95% confidence intervals, 0.76 to 1.24). There were fewer major complications in patients who received TPN, although there was significant heterogeneity in the overall estimate (risk ratio = 0.81, 95% CI, 0.65 to 1.01). Because of this significant heterogeneity, several a priori hypotheses were examined. Studies that included only malnourished patients demonstrated a trend to a reduction in complication rates but no difference in death rate when compared with studies of patients who were not malnourished. Studies published in 1988 or earlier and studies with a lower methods score were associated with a significant reduction in complication rates and a trend to a reduction in death rate when compared with studies published after 1988 and studies with a higher methods score. There was no difference in studies that provided lipids as a component of TPN when compared with studies that did not. Studies that initiated TPN preoperatively demonstrated a trend to a reduction in complication rates but no difference in death rate when compared with studies that initiated TPN postoperatively. *Conclusions:* TPN does not influence the death rate of surgical patients. It may reduce the complication rate, especially in malnourished patients, but study results are influenced by methodologic quality and year of publication. (Can Jour Surg 44:102–111, 2001)

COMMENT: Meta-analysis combines the data from 2 or more studies that address the same clinical question, thereby increasing the power to identify a difference between the treatment and control groups. The 27 randomized controlled trials (RCTs) in this meta-analysis compared parenteral nutrition (PN) to standard therapy (no nutritional support) in perioperative patients. All but 4 of these trials were similarly analyzed previously by this group in a review of PN in the critically ill.[1] That 1998 effort did include 2 other trials excluded from this paper.

Not surprisingly, the conclusions were quite similar. When the data from the trials enrolling 2,907 surgical patients were combined, PN was not found to have any favorable effect on mortality or morbidity. When Heyland et al[1] performed a series of subgroup analyses, they did find a possible beneficial effect (reduction in postoperative complications) in malnourished patients, but this conclusion was weakened by the fact that the data came from older trials of poorer quality.

Tim Lipman, Sam Klein, and I recently performed a similar meta-analysis of 41 RCTs as part of a systematic review of PN.[2] Our overall conclusions were similar to those of Heyland et al,[1] although we did have some minor differences with regard to a few of the subgroup analyses. The largest benefit that we identified, and the only one that might be justifiable with regard to resource expenditure, was an absolute reduction in the major complication rate of 18% (number needed to treat = 5.5) in patients undergoing surgery for upper gastrointestinal (UGI) cancer. The fact that we did not precisely duplicate the observations of Heyland et al[1] is probably best explained by the fact that we included and excluded different RCTs. Except for the severely malnourished patient, or those with UGI cancer, it is very difficult to justify the use of PN during the perioperative period.

Ronald L. Koretz, MD

References

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Analysis of Patients with Longitudinal Intestinal Lengthening Procedure Referred for Intestinal Transplantation

J Bueno, J Guiterrez, GV Mazariegos, et al
Children's Hospital of Pittsburgh, Thomas E. Starzl Transplantation Institute, University of Pittsburgh and Gastroenterology and Complejo Hospitalario Juna Canalejo

ABSTRACT: *Background/Purpose:* Longitudinal intestinal lengthening procedures (LILP) in patients with short gut syndrome (SGS) enhances small intestinal peristalsis and decreases bacterial overgrowth without reducing absorptive surface. Therefore, patients theoretically may be easily weaned off TPN. The

aim of this study was to evaluate the impact of failed LILP in SGS patients referred for intestinal transplantation. *Methods:* Twenty-seven (11%) of 230 children with SGS and total parenteral nutrition (TPN) dependency evaluated for intestinal transplantation at our institution had undergone LILP. This was performed at a mean age of 1.7 years (range, 1 day to 14.7 years); the mean age at the time of evaluation was 3.3 years (range, 0.4 to 17 years). Two patients underwent LILP immediately after birth. The principle diagnoses producing SGS were gastroschisis (n = 8), intestinal atresia (n = 11), neonatal volvulus (n = 7) and necrotizing enterocolitis (n = 1). Before LILP, the mean length of intestine was 32 cm (range, 8 to 70 cm). Fifteen (56%) patients had jaundice at the time of evaluation. *Results:* All but one child were considered candidates for intestinal transplantation. The mean intestinal length achieved after LILP was 48 cm (range, 16 to 100). The mean follow-up from the date of LILP was 876 days (range, 109 to 4,109 days). After LILP, only 9 (33%) patients increased their caloric intake through the enteral route by 50%, and only 1 patient could be weaned off TPN. In the patients with liver dysfunction at the time of LILP, none recovered. Most of the patients had multiple episodes of sepsis after LILP. Fourteen (52%) of 27 patients underwent intestinal transplantation, 7 combined with a liver allograft because of TPN-induced end-stage liver disease. Six of the transplanted patients are alive and TPN free. Of the remaining 13 (48%) nontransplanted patients, 9 patients died. The main cause of death was TPN-induced liver failure. Three patients are on partial TPN, and only 1 patient was weaned off TPN. The presence of an ileocecal valve did not impact on outcome. Surprisingly, patients with 50% of colon at the time of LILP had poorer survival than those with less. Twelve (44%) of 27 patients had surgical complications, and in both patients with LILP performed in the neonatal period it failed immediately with acute complications. There were no differences in patient survival rate for patients with SGS without LILP (n = 203) and those with LILP (n = 27). *Conclusion:* Based on patients with unsuccessful LILP referred for intestinal transplantation, we believe this procedure should be avoided in the neonatal period, in those patients with liver dysfunction, and when intestinal length is <50 cm. (J Pediatr Surg 36:178–183, 2001)

COMMENT: There is perhaps no greater challenge to a nutritionist than the care of a child with short bowel syndrome. Despite numerous surgical approaches to this disorder, the intestinal lengthening procedure, as advanced by Bianchi,[1] is one of the most popular. This procedure preserves intestinal tissue, removes dilated (and often stagnant) segments of bowel, and increases the length of the intestine. The article finds little support of the use of an intestinal lengthening procedure; showing only 33% increased enteral intake, and only 1 child weaned from parenteral nutrition (PN). Unfortunately, this article contributes little to our knowledge of such patients. The article completely biases (type I error) the subject by examining only those patients who were referred for intestinal transplantation (which by its very nature denotes a failure of nontransplant therapy). A true analysis of all children undergoing a Bianchi procedure was not done. Clinicians reading this article should *not* be dissuaded from pursuing an intestinal lengthening procedure but should rather approach each patient individually and examine the potential benefits and risks of the procedure.

Daniel H. Teitelbaum, MD

Reference

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Gastroschisis: A Plea for Risk Categorization

KA Molik, A Gingalewski, KW West, et al
Section of Pediatric Surgery, Department of Surgery, Indiana University School of Medicine, and the James Whitcomb Riley Hospital for Children, Indianapolis

ABSTRACT: *Background:* The incidence of gastroschisis has increased in the past decade. A differing clinical course between "complex" (those with atresias, perforation, or stenosis) and "simple" cases has prompted a review of risk assessment factors. *Methods:* A retrospective chart review was conducted of 103 infants with gastroschisis over 5 years (1992 to 1997). *Results:* Of 103 infants, 52 were girls and 51 were boys. Seventy-one infants (69%) had a simple defect, and 32 (31%) were complex. The simple group had an average estimated gestational age of 37.5 weeks (range, 26 to 40), and a birth weight of 3.0 kg (range, 1.7 to 3.8). A total of 71% underwent primary repair, whereas 29% required a silo. Mechanical ventilation averaged 6.8 days (range, 1 to 19). Enteral feedings were initiated at 15 days (range, 3 to 27) with full enteral intake achieved by 22.4 days (range, 5 to 40). Three infants required home parenteral nutrition. The average length of stay (LOS) was 26.4 days (range, 10 to 57). Complications occurred in 26 infants (36%), including intravenous catheter sepsis (n = 15), pneumatosis (n = 2), pneumonia (n = 1), bowel obstruction (n = 7), wound infection (n = 5), and SVC thrombosis (n = 1). Survival rate was 100%. Thirty-two infants had complex defects; 27 patients had atresias, stenosis, or perforations; and 3 had volvulus. The average estimated gestational age was 34 weeks (range, 26 to 38), and birth weight was 2.0 kg (range, 0.9 to 4.0). Primary repair was performed in 65% and silo placement in 35%. Mechanical ventilation was required for 22.3 days (range, 2 to 14). Enteral feedings were initiated at 22.5 days (range, 6 to 56) with full feedings achieved at 50 days (range, 21 to 113). Fourteen infants required home total parenteral nutrition (TPN). The LOS was 85.4 days (range, 24 to 270). A total of 47 complications occurred in the complex group including catheter sepsis (n = 15), short bowel syndrome (n = 7), pneumatosis (n = 3), bowel obstruction (n = 4), pneumonia (n = 2), superior vena cava thrombosis (n = 1), enterocutaneous fistula (n = 1), and 9 deaths (28% mortality rate). *Conclusions:* These data indicate gastroschisis can be divided into low-risk (simple) and high-risk (complex) categories. These 2 groups have significant differences in clinical behavior, postsurgical complications, LOS, and mortality rate (0 *v* 28%). Although the overall survival rate was 91% (94 of 103), parents, referring physicians, and insurers must be made aware of the impact of risk categorization on the estimated cost, LOS, and outcomes. (J Pediatr Surg 36:51–55, 2001)

COMMENT: With the implementation of parenteral nutrition (PN), the survival of neonates with gastroschisis has gone from almost certain death to 90% survival. Despite this, a persistent morbidity and mortality remains. Molik et al analyzed morbidity and mortality by stratifying gastroschisis patients with (complex) or without (simple) the associated comorbidities of intestinal atresias, perforations, necrotic segments, and volvulus. They found that survival was distinctly different between groups (100% *vs* 72% in simple *vs* complex patients, respectively). Associated complications including sepsis, short bowel syndrome, and pneumatosis were also increased in the complex group. Using this stratification may help the clinician anticipate outcomes and advise families on the antici-

pated outcomes. A major deficiency of this study is their statistical approach. Despite having a large number of infants (n = 103), there was no attempt to perform a multivariate analysis. This approach would have allowed one to actually model risk factors as opposed to the authors' arbitrary selection of a categorization.

Daniel H. Teitelbaum, MD

Comparison Between Nasogastric Tube Feeding and Percutaneous Fluoroscopic Gastrostomy in Advanced Head and Neck Cancer Patients

N Magne, PY Marcy, C Foa, et al
Centre Antoine, Lacassagne, Nice, France

ABSTRACT: Wasting is a major complication of advanced head and neck cancer and the aim of this study was to compare nasogastric tube feeding (NG) and percutaneous fluoroscopic gastrostomy (PFG) in these patients. The goal of these two methods of nutritional support was to improve or maintain the initial nutritional status during treatment. A total of 90 patients, all stage IV oropharynx or hypopharynx tumor, were reviewed from a prospective databank. All these patients were treated by concomitant chemotherapy and twice-daily continuous radiotherapy with no acceleration. Fifty patients were managed by PFG and the rest by NG. Mechanical failure, duration of feeding, complications, nutritional evaluation and quality of life were analyzed. Mechanical failure occurred in 32 of the 40 NG patients and in seven of the gastrostomy group. In the PFG group, two presented a wound infection and six had aspiration pneumonia while in the NG group, 21 had aspiration pneumonia probably due to the NG tube (gastroesophageal reflux). The feeding methods were found to be equally effective at maintaining body weight and body mass index at time 1 (3 weeks) and at time 2 (6 weeks). Advantages were associated with PFG cosmesis, mobility and quality of life. PFG is a safe and effective method of providing enteral nutrition during treatment to patients with advanced head and neck cancer and offers important advantages over NG. (Eur Arch Otorhinolaryngol 258:89–92, 2001)

COMMENT: Appropriate selection of enteral feeding route and timing are keys to successful outcomes. The statistical method used by these researchers appears appropriate; however, analysis was only used to compare body mass index (BMI) between the 2 groups. This difference was reported as "not statistically significant" yet the calculated p value was not given. Further subdivision of the 2 groups occurred, categorizing patients as those with BMI < 20 kg/m^2 (malnourished) and those with BMI > 20 kg/m^2 (normal nutritional status). Approximately one-third of patients in both groups had a BMI < 20 kg/m^2. Percutaneous fluoroscopic gastrostomy (PFG) was performed in 76% of patients 5 days before initiation of concomitant chemotherapy and radiation therapy. None of the patients in the nasogastric (NG) group received their feeding tube until after the initiation of their cancer treatment. This permitted 2 additional days of feeding in the PFG group. Another concern of the study design is that the consumption of oral diet was not controlled in any way. It is unknown whether patients of greater BMI were better able to tolerate an oral diet than those with BMI < 20 kg/m^2. Surviving patients who participated in the quality-of-life questionnaire indicated greater satisfaction in the PFG group. Details revealing whether patients with BMI $>$ 20 kg/m^2 tolerated the procedures and nutritional treatment with fewer complications yielding greater satisfaction than those with BMI < 20 kg/m^2 are unknown. Analysis of these findings may have yielded greater statistical significance and given more substance to the results of this study.

The raw data presented upholds current clinical practice with regard to enteral nutrition support. Placement of permanent feeding tubes is recommended when enteral feeding is required for 4 or more weeks. Permanent feeding tubes typically are intact and patent for longer time periods and are associated with fewer complications than NG tubes. The population selected for this study is at high risk for malnutrition. Patients may accept early placement of PFG. The impact of this intervention on morbidity and mortality when compared with degree of malnutrition and other enteral feeding routes requires further study.

Nancy J. Park, RD, MS, CNSD