

Thesis Title Evaluation of the Efficacy of Total
Parenteral Nutrition on Nutritional
Status in Surgical Patients
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ABSTRACT

The purpose of this study is to evaluate the efficacy of total parenteral nutrition (TPN) on nutritional status in surgical patients. Twenty patients were recruited. They were divided into 2 groups according to the type of nutritional support prescribed. Group I consisted of 4 men and 3 women with carcinoma of the gastrointestinal (GI) tract and the mean(\pm SEM) age of 60.57 ± 3.89 yrs. They received preoperative TPN for 7 days (D-7 to D-1) with the mean daily energy intake of 2,147 kcal derived from 12.2% amino acid-, 24.4% fat-, and 63.4%

glucose-calories. On the day of operation (D0), they received the mean energy intake of 943 kcal derived from 2.8% amino acid-, 3.7% fat-, and 93.5% glucose-calories. TPN was provided during 7 postoperative days (D1-7). Their mean daily energy intake during D2-7 was 2,198 kcal derived from 11.7% amino acid-, 23.1% fat-, and 65.2% glucose calories. Group II consisted of 8 men and 5 women with the mean(\pm SEM) age of 63.85 \pm 4.30 yrs. Ten patients suffered from carcinoma of the GI tract whereas the other 3 were non-cancer cases. After the admission (D-1), they received oral diets with or without partial parenteral nutrition (PPN), PPN only at D0-2, and PPN with or without oral diets during D3-7. Their mean daily energy intakes at D-1, D0, D1 and D2-7 were 844, 546, 518, and 660 kcal. The energy distributions were 3.1% protein-, 4.7% fat-, and 92.2% carbohydrate-calories at D-1, 100% glucose-calories during D0-1, and 3.0% protein-, 6.8% fat-, and 90.2% carbohydrate-calories during D2-7.

The results of the study are summarized below.

On admission both groups had inadequate energy store, somatic protein status, and visceral protein status. evidenced by low contents of body fat and FFM, low levels of serum albumin, transferrin, RBP, apo A-I and apo B. The degree of inadequate protein-energy status in group I was more severe than that in group II. The TPN

regimens providing to group I during D-7 to D-1 were adequate to maintain their protein-energy status evidenced by no significant differences in their body weight, BMI, serum albumin, transferrin, and RBP levels between D0 and D-7. The inadequate protein-energy supply in the presence of stress response to surgery affected the protein-energy status in both groups evidenced by the significant decreases in their serum total protein, albumin, and RBP levels at D1. The importance of adequate protein-energy supply in postoperative patients is evidenced by no further decreases in the body weight and BMI as well as significant increases in serum RBP level in group I at D7. On the contrary, group II exhibited significant decreases in their body weight, BMI, and serum transferrin level at D7. Throughout the study, group II exhibited negative nitrogen balance. Group I exhibited positive nitrogen balance during D-7 to D-1, but negative balances at D0, D1, and D2-7. However, their negative balances became less severe with increased intakes of energy and amino acids.

Group I at D-7 and group II at D-1 had low serum TC, TG, apo A-I, and apo B levels. Both groups exhibited drastic decreases in serum TC, TG apo A-I, and apo B levels at D1; these were due to their low energy and amino acid intakes at D0. The significantly lower serum TC and

apo B levels in group I at D0 and D7 than those at D-7 are due to the following reasons: cholesterol-free intake, total fat intakes of 23.1-24.4% calories, and low saturated fatty acid content but high linoleic acid content of fat emulsions. The amount of fat emulsions provided to group I was effectively utilized, evidenced by mild elevation of serum TG level at D0 and normotriglyceridemia at D7. The significantly lower serum TC, TG and apo B levels in group II at D7 than those at D-1 are consistent with their low intakes of energy, protein, fat and carbohydrate during D2-7.

Hyperglycemia in both groups at D1 is most likely due to the parenteral administration of glucose at D0 in the presence of insulin resistance due to surgical stress.

Both groups had Hb levels of <120 g/L throughout the study. Iron-deficient erythropoiesis should be the major factor causing their anemia evidenced by high FEP levels, ie, >70 $\mu\text{g/dLRBC}$ in group I and >60 $\mu\text{g/dLRBC}$ in group II throughout the study.

Mild degree of hepatic dysfunction induced by high nonprotein energy intakes of 41.8-42.8 kcal/kg/d, nitrogen intake of 0.23 g/kg/d, and fat intakes of 24.9-26.5% of nonprotein calories during receiving TPN was also observed by the findings of significant increases in serum aspartate aminotransferase and gamma-glutamyltransferase

at D0 and D7, alanine aminotransferase at D0, alkaline phosphatase, total and direct bilirubin at D7.

Inadequate phosphorous and magnesium intakes had the significant effects in lowering serum phosphorus and magnesium levels.

The study has shown the beneficial effects of TPN in surgical patients undergoing surgery for improving their protein-energy status, nitrogen balance, and serum major mineral levels. However, iron should be added in parenteral regimens in order to improve their iron status. Nonprotein energy/g nitrogen should be reduced under stress condition in order to achieve positive nitrogen balance and prevent TPN-associated hepatic dysfunction.