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6 Intradialytic Parenteral Nutrition for Hemodialysis Patients

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Report

Most patients end-stage renal disease (ESRD) who are undergoing hemodialysis (HD) have intact and fully functional gastrointestinal systems. However, many of these patients become malnourished from inadequate intake of nutrients as the result of anorexia, frequent acute intercurrent illness, dietary restrictions, or nutrient losses into the dialysate.(2) Evidence such as the finding that serum albumin levels appear to inversely correlate with mortality in a large population of dialysis patients(2), suggests that poor nutrition may contribute to increasing the morbidity and mortality of HD patients.(3) In view of these indications, nutritional supplements, referred to as intradialytic parenteral nutrition (IDPN), have been administered intravenously during hemodialysis treatment in attempts to improve the nutritional status of these patients. The amount and composition of solutions administered during dialysis are adjusted according to the patient's estimated needs.

Background

Whether parenteral administration of nutrients during the course of dialysis improves nutritional status and is beneficial to ESRD patients has been debated for more than 20 years. Most studies described in the literature have failed to demonstrate consistent positive effects of IDPN or have lacked the information necessary for interpretation of the reported results.

Foulks et al(4). reviewed the date from eight studies(5-12). published from 1975 to 1987 that purported to evaluate the effects of providing either parenteral or oral nutritional supplements during the dialysis period as a treatment for malnutrition. Since the studies had many shortcomings, Foulks et al(4). were unable to conclude whether IDPN served any role in the nutritional management of HD patients. Most of the studies were of short duration, and patients were given both oral feedings and parenteral solutions of varying compositions. The number of subjects in each study ranged from 4 to 21, with half of the studies having fewer than 10 patients. The beneficial effects of IDPN as a treatment for malnourished HD patients were not clearly evident, especially since the investigators failed to indicate the means by which they assessed the nutritional status of their subjects and whether their patients were malnourished. In two of the studies(8,9), in which the patients had documented malnourishment, the number of patients with positive responses to IDPN was equal to the number who had no response or whose nutritional status continued to decline.

Discussion

Since the publication of Foulks and colleagues' review, additional studies of the effects of IDPN in HD patients have been reported.

Equivocal results were observed in two studies. Madigan et al(13). treated nine dialyzed diabetic patients with IDPN. After 2 months, three patients had gained weight, four had lost weight, and two had no change in weight. Four patients had increased appetites and five had decreased appetites. In the second study, data available from five of nine patients(14). demonstrated no significant effect of IDPN on the serum chemistry values of these patients, but IDPN appeared to stimulate their appetites.

Two case reports related beneficial effects of IDPN. The first described a diabetic woman with ESRD who had lost weight and strength as a result of persistent nausea and vomiting and frequent episodes of diarrhea.(15). After 6 months of IDPN administration, the patient regained weight and strength to the extent that she was able to ambulate for short distances without assistance and resume many daily activities. The second report described the administration of IDPN to a malnourished man undergoing HD who was losing weight and was unable to maintain nutritional adequacy by oral feeding.(16). Three months after IDPN therapy was started, the patient's improvement and his nausea, vomiting, and anorexia were resolved.

Bilbrey and Cohen(3). ascertained the incidence and severity of protein-calorie malnutrition and mortality in 204 long-term HD patients with various degrees of malnutrition. Twenty of these patients, who had moderate to severe malnutrition, were treated with IDPN three times per week for 90 days. Although all malnutrition parameters were not improve, the baseline malnutrition index of these 20 patients improved significantly with the IDPN therapy. Significant increases were noted in protein-calorie malnourishment parameters such as body weight, mid-arm circumference, transferrin, blood urea nitrogen, and protein catabolic rate, but no change in other parameters such as serum albumin, triceps skinfold thickness, total lymphocyte count, and mid-arm muscle circumference (mid-arm circumference: 3.14 x triceps skinfold thickness) was reported.

In a controlled study, Cano et al(17). showed that administration of IDPN had positive effects on the nutritional status of HD patients. Twenty-six patients were included in this study: 12 were randomly assigned to receive IDPN and the remaining 14 served as controls. IDPN solutions containing amino acids and lipids were administered three times a week during hemodialysis for 3 months. Significant improvements in the nutritional status of HD patients were noted in those who received IDPN, while a general decline was noted in the control subjects. Specifically, serum albumin levels, skin-test scores, transthyretin levels (formerly termed thyroxine-binding prealbumin), creatinine levels, weight, and appetite responded positively.

The American Society for Parental and Enteral Nutrition (ASPEN), a voluntary, professional society composed primarily of physicians, nurses, dietitians, and pharmacists involved in nutrition-support services, provided information indicating that the effects of IDPN in the care of patients with renal failure have varied. Although malnourished HD patients with significant gastrointestinal dysfunction appear to have benefited from IDPN, data given clear evidence of benefit because of the lack of uniform patient selection criteria, failure to randomize, small sample size, and other problems that arise in clinical trials. Even though IDPN may be of benefit to some malnourished HD patients, there are no data on which to base criteria for selection of
patients who might benefit, the volume and composition of the solution to use, or the length of time IDPN should be administered. ASPEN stated that there is a small subset of HD patients with significant gastrointestinal symptoms who might be selected for and benefit from IDPN on a case-by-case basis.

**Summary**

Results such as those observed by Cano et al.,(17), and the accepted intravenous administration of nutrients to support the nutritional status of patients with totally dysfunctional gastrointestinal systems, would indicate that IDPN may be beneficial for HD patients with significant gastrointestinal dysfunction who become severely malnourished. However, with the exception of the study by Cano et al(17) the effects of IDPN have been equivocal. Although Bilbrey and Cohen(3), suggest measurable parameters that may identify malnutrition in HD patients, the characteristics of those patients who appeared to have benefited from IDPN treatment were not evident from the published literature. Other important issues that have not been addressed are:

- Is IDPN of benefit to HD patients?
- What are the criteria for selection of patients who might benefit from intravenous supplemental nutrients?
- How long should IDPN therapy be applied?
- How much volume should be administered?
- What is the composition of an effective IDPN solution?

Well-controlled studies to answer these questions are needed before the role of IDPN therapy in the treatment of HD patients can be defined. The possibility remains that improving the nutritional status may improve the morbidity and mortality outcomes of some HD patients. These conclusions are in agreement with those expressed in comments and statements received from ASPEN.

**References**

12. Moore L, Acchiardo S. Aggressive nutritional supplementation in chronic hemodialysis patients. CRN Q. 1987;11:–.