



Review

Advances in Medical Nutrition Therapy: Parenteral Nutrition

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Abstract: Parenteral nutrition has evolved tremendously, with parenteral formulas now safer and more accessible than ever. “All-in-one” admixtures are now available, which simplify parenteral nutrition usage and decrease line infection rates alongside other methods of infectious control. Recently published data on the benefits of parenteral nutrition versus enteral nutrition together with the widespread use of indirect calorimetry solve many safety issues that have emerged over the years. All these advances, alongside a better understanding of glycemic control and lipid and protein formulation improvements, make parenteral nutrition a safe alternative to enteral nutrition.

Keywords: parenteral nutrition; lipid emulsion; glucose control; Indirect calorimetry

1. Introduction

When providing nutrition support to a patient, the oral route is the preferred option. Many acute and chronic medical conditions, such as dysphagia or reduced levels of consciousness, do not allow the use of oral nutrition. In these cases, enteral nutrition should be given to support the patient’s nutritional needs. Parenteral nutrition provides intravenous nutrition for patients who are unable or cannot tolerate enteral nutrition, such as patients with intestinal failure, paralytic ileus, bowel ischemia, etc. It has been more than half a century since parenteral nutrition was first introduced. In the past, primary formulas were rich in glucose, since lipid emulsions were not available, and proteins were mainly large and not properly utilized. Over time, with advancements in technology, significant changes and improvements were made in order to make the formulas more physiological and accessible with fewer significant side effects. Furthermore, better understanding of patients’ needs allowed parenteral nutrition solutions to be individualized according to the patient or clinical condition. This review summarizes the latest changes made in parenteral nutrition.

2. Advances in Pharmaceutical Preparation: “All-in-One” Admixtures

Historically, parenteral nutrition was administered in separate bottles containing a carbohydrate solution, an amino acid hydrolysate, and a lipid emulsion together with vitamins and trace element vials. Over the last few decades, all-in-one (three-in-one) admixture (AIO) systems for parenteral nutrition have become available [1,2]. The use of these systems prevents component manipulation, thereby reducing the probability of contamination. This method requires only one intravenous access, lowering the risk of infection. A recent literature review showed that the use of all-in-one admixtures had significant advantages regarding rates of bloodstream infections and therefore length of stay [3]; a summary of these studies is shown in Table 1. AIO systems provide simpler prescriptions, save time, and reduce workload and costs [4]. In a paper published by Pichard et al., a significant reduction in preparation time was shown throughout all levels of manpower, including the physician’s prescription, the nurse’s administration and preparation, and the pharmacist’s compounding total parenteral

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