

Complications of Parenteral Nutrition in the Surgical Patient

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ABSTRACT

Parenteral nutrition plays a crucial role in the management of surgical patients who cannot receive sufficient nutrition orally or enterally. This review article analyzes the epidemiology, significance, theoretical framework, complications and discussion of parenteral nutrition in surgical patients. Total parenteral nutrition (TPN) is used to prevent malnutrition, improve wound healing and reduce complications. Complications include infections, electrolyte imbalances, metabolic disorders, and adverse reactions. The optimal duration, composition and personalization of nutritional therapy are debated topics. The importance of a thorough nutritional assessment and monitoring of possible metabolic changes is highlighted. In conclusion, parenteral nutrition is essential in surgical patients, but requires proper implementation and management. The individualization of therapy, nutritional composition and prevention of complications are crucial aspects to consider. More research is required to improve the safety and efficacy of parenteral nutrition in these patients.

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INTRODUCTION

Parenteral nutrition is an essential component in the perioperative management of surgical patients who have an inability to obtain adequate nutritional intake through the oral or enteral route. The prevalence of parenteral nutrition in this context has been increasing due to the increase in complex surgeries, patients with metabolic diseases and those requiring prolonged or high-risk surgical procedures. It is estimated that between 5% and 10% of surgical patients need total parenteral nutrition (TPN) during their recovery period. Parenteral nutrition plays a crucial role in the care of surgical patients by providing adequate nutritional support to maintain nutritional balance, optimize the immune response and promote postoperative recovery. Preoperative malnutrition is common in these patients due to the underlying disease, metabolic stress of surgery, and perioperative fasting. Parenteral nutrition can meet nutritional requirements and minimize the risk of complications related to malnutrition, such as decreased immune function, loss of muscle mass and delayed wound healing.

DEFINITION

Parenteral nutrition is a nutritional support modality that involves the administration of nutrients directly into the bloodstream, bypassing the gastrointestinal tract. It is used in surgical patients who have inability to ingest food orally or

enterally, either due to gastrointestinal dysfunction, obstruction, fistulas, malabsorption, or other medical conditions that prevent adequate nutrient intake. Parenteral nutrition provides an external source of essential nutrients to maintain nutritional balance and promote patient recovery.

Types of parenteral nutrition

There are two main types of parenteral nutrition used in the surgical patient:

Total parenteral nutrition (TPN)

TPN involves the administration of all the nutrients necessary to meet the daily requirements of the patient. The composition of the nutritional mixture includes proteins, carbohydrates, lipids, vitamins, minerals and trace elements. It is administered through a central venous line to ensure proper absorption and distribution of nutrients. TPN is used when oral or enteral intake is impossible or contraindicated, and a complete nutritional contribution is required to maintain homeostasis and promote recovery.

Partial parenteral nutrition (PPN)

PPN is used as an adjunct to insufficient oral or enteral intake. In this case, additional nutrients are administered through the parenteral route to ensure adequate nutritional intake. PPN may be beneficial in situations where oral or enteral intake is not sufficient to meet the patient's nutritional needs, but adequate gastrointestinal function is still maintained.

Complications

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Although parenteral nutrition is a valuable tool in the management of surgical patients, its use carries the risk of complications. Some of the most common complications associated with parenteral nutrition include:

Catheter-related infections

The presence of a central venous catheter used for the administration of parenteral nutrition may increase the risk of infections, such as bacteraemia and insertion site infection. The implementation of prevention measures, such as proper hygiene, asepsis during catheter insertion and regular monitoring, are essential to minimize the risk of infections.

Electrolyte imbalances

Monitoring and adjusting electrolyte levels is essential in parenteral nutrition, as imbalance can have serious consequences for the patient. Sodium, potassium, calcium, phosphorus, and magnesium levels should be assessed regularly and adjustments made to the composition of the nutritional mixture to maintain a proper electrolyte balance.

Metabolic disorders

Parenteral nutrition can affect the patient's metabolism, which can lead to metabolic disorders such as hyperglycemia, hypoglycemia, hypophosphatemia or hypomagnesemia. Regular monitoring of blood glucose levels and other metabolic parameters is essential to detect and correct any metabolic disturbances.

Liver disorders

Long-term use of parenteral nutrition can have an impact on liver function. Hepatic steatosis, cholestasis, and parenteral nutrition-induced hepatitis are potential complications. Monitoring of liver function and adjustment of the composition of the nutritional mixture may be necessary to minimize the risk of liver disorders.

Alterations of lipid metabolism

Administration of lipids in parenteral nutrition may lead to complications such as hypertriglyceridemia and hepatic steatosis. Control of lipid administration and regular monitoring of blood lipid levels are essential to prevent these complications.

Adverse reactions

Some patients may experience adverse reactions to the components of the nutritional mixture, such as allergies or intolerances. Monitoring symptoms and identifying potential allergens are important to avoid adverse reactions and adjust the composition of the nutritional mix accordingly.

DISCUSSION

Parenteral nutrition plays a fundamental role in the management of surgical patients, since it allows to cover the nutritional requirements necessary to maintain the nutritional balance, optimize the immune response and favor postoperative recovery. However, its proper implementation and management are crucial to maximize the benefits and minimize the associated risks.

One of the key aspects in the discussion is the optimal duration of parenteral nutrition in the surgical patient. There

is debate in the medical literature about how long parenteral nutrition should be maintained, especially in patients who can resume oral or enteral intake early. Some studies suggest that a gradual transition to oral or enteral feeding may be beneficial, while others support the continuation of parenteral nutrition until pre-established nutritional goals are achieved. It is important to evaluate each patient individually and consider factors such as ability to tolerate oral or enteral intake, preoperative nutritional status, and type of surgery performed.

In addition, the exact composition of nutritional mixtures used in parenteral nutrition is also debated. There are different formulations available on the market, each with its own macronutrient and micronutrient ratios. Some studies suggest that the addition of nutrients with immunomodulatory properties, such as omega-3 fatty acids, nucleotides and antioxidants, may improve inflammatory response and wound healing in surgical patients. However, more research is required to establish clear guidelines on the optimal composition of nutritional mixtures in different surgical situations.

The individualization of nutritional therapy is another relevant aspect in the discussion. Each surgical patient has unique nutritional needs and their metabolic status may change throughout the perioperative period. Therefore, it is critical to perform a complete nutritional assessment and adjust nutritional therapy appropriately to optimize outcomes. Regular monitoring of nutritional parameters, such as albumin levels, prealbumin, and other indicators of nutritional status, may be useful to assess the effectiveness of nutritional therapy and make adjustments as needed.

Immunonutrition is another important aspect in the discussion. The surgical patient's immunity may be compromised due to the metabolic stress of surgery and the associated inflammatory response. The addition of nutrients with immunomodulatory properties may help improve the immune response and reduce the incidence of infectious complications and postoperative morbidity. However, more research is needed to establish clear guidelines on the use and benefits of immunonutrition in the context of parenteral nutrition in surgical patients.

Importantly, parenteral nutrition is not without complications. Catheter-related infections, metabolic disorders, electrolyte imbalances, and adverse reactions to components of the nutritional mix are potential complications that need to be addressed and closely monitored. The implementation of infection prevention protocols, regular monitoring of biochemical parameters and constant patient surveillance are crucial aspects to minimize the risk of complications and ensure the safety of parenteral nutritional therapy.

CONCLUSION

In conclusion, parenteral nutrition plays an essential role in the management of surgical patients who cannot receive adequate oral or enteral nutrient intake. The optimal duration

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of parenteral nutrition, the composition of nutritional mixtures, the individualization of therapy and the consideration of immunonutrition are important aspects to discuss and evaluate in clinical practice. In addition, it is critical to address and manage potential complications associated with parenteral nutrition. Continued research and clinical studies are necessary to further improve the efficacy, safety, and outcomes of parenteral nutrition in the surgical patient.

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