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Nutritional Interventions in Patients with Mild and Severe Burns: A narrative Review

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Abstract

Burn injuries impose significant metabolic demands on the body, leading to hypermetabolism and catabolism, which can result in malnutrition and impaired healing if not properly managed. Nutritional support is essential for improving outcomes in burn patients, with the severity of the burn influencing the intensity and approach of nutritional intervention. This review discusses the various nutritional interventions and techniques used in managing mild and severe burn patients, emphasizing the role of macronutrients,

micronutrients, and specialized feeding methods to optimize recovery.

Keywords: Nutritional Interventions, Patients, Mild, Severe Burns.

1. Introduction

Burn injuries trigger a profound metabolic response characterized by increased energy expenditure, protein catabolism, and oxidative stress, which can compromise immune function and delay wound healing if not properly

managed(1). Adequate and targeted nutritional support is therefore crucial in burn care. Nutritional needs vary according to the severity of the burn and individual patient characteristics, including age, burn size, and existing health status. Nutritional support is a critical aspect of the treatment of burn patients. The metabolic rate of these patients can be greater than twice the normal rate, and this response can last for more than a year after the injury (2,3) This review examines the techniques and strategies used to meet the unique nutritional needs of both mild and severe burn patients.

2. Nutritional Needs in Burn Patients

2.1 Energy Requirements

Burn patients require significantly higher caloric intake to support their heightened metabolic demands. Studies show that caloric requirements can increase by up to 200% in severe burns, depending on the extent and depth of the injury(4). Accurate energy needs assessment is essential to avoid both underfeeding and overfeeding, which could exacerbate metabolic complications. Methods such as indirect calorimetry are recommended for estimating resting energy expenditure (REE) in burn patients, although predictive equations are also used when indirect calorimetry is unavailable(5).

2.2 Protein

Protein is critical for tissue repair and immune function, with requirements being particularly high in burn patients due to increased protein catabolism. It is recommended that protein intake in burn patients ranges from 1.5 to 2.5 g/kg/day to support nitrogen balance and reduce muscle wasting(6). High-protein enteral formulas or protein supplements are commonly used to meet these needs in both mild and severe burn cases, with branched-chain amino acids (BCAAs) and glutamine supplementation showing benefits in muscle preservation and immune support (7).

2.3 Micronutrients

Micronutrient supplementation is critical in burn patients, as they have elevated requirements for vitamins and minerals involved in wound healing, immune function, and antioxidant defense. Vitamins A, C, and E, along with zinc and selenium, are particularly important. Vitamin C, for instance, enhances collagen synthesis and promotes immune function, while zinc is vital for protein synthesis and immune cell function(8). Multivitamin and trace element supplementation are therefore standard in burn care protocols.

3. Nutritional Techniques in Mild Burns

For patients with mild burns (usually involving less than 20% of the total body surface area), oral nutrition is often sufficient, provided that the patient's appetite and gastrointestinal function are intact. In these cases, high-protein, high-calorie diets are recommended, along with oral nutritional supplements as needed (9).

3.1 Oral Nutritional Supplements

Oral nutritional supplements can provide additional calories and protein in a concentrated form, ensuring that patients with reduced appetite meet their nutritional requirements. These supplements are enriched with key vitamins and minerals necessary for healing(9).

3.2 Enteral Nutrition for Mild Burns

In some mild burn patients who are unable to meet their nutritional needs orally, enteral nutrition (EN) may be initiated. Enteral feeding has been shown to preserve gut integrity, reduce bacterial translocation, and improve immune function (10). EN is preferred over parenteral nutrition due to its lower risk of infection and other complications.

4. Nutritional Techniques in Severe Burns

Severe burns (involving more than 20% of the body surface area) require more intensive nutritional support due to the profound metabolic response and increased risk of malnutrition.

4.1 Early Enteral Nutrition (EN)

Early initiation of enteral nutrition within 24 hours of injury is recommended for patients with severe burns, as it helps to reduce the hypermetabolic response and preserve gut integrity (11). Continuous enteral feeding with specialized high-protein, high-calorie formulas is preferred. Studies have shown that early EN improves outcomes, reducing the incidence of infections and promoting faster wound healing (12).

4.2 Parenteral Nutrition (PN)

While enteral nutrition is the preferred route, parenteral nutrition (PN) may be necessary for patients with severe burns who cannot tolerate EN due to gastrointestinal complications. PN provides essential nutrients directly into the bloodstream, bypassing the gastrointestinal tract (13). However, it is associated with higher risks of infection and liver complications, so it is usually reserved for cases where EN is contraindicated or insufficient.

4.3 Immunonutrition

Immunonutrition involves the use of nutrients that have specific immune-enhancing properties, such as omega-3 fatty acids, arginine, and nucleotides. Omega-3 fatty acids, for instance, have anti-inflammatory properties and may reduce the risk of infection in burn patients (14). Immunonutrition has been shown to improve immune function and reduce hospital length of stay, especially in patients with severe burns (15).

4.4 Antioxidants and Trace Elements

In patients with severe burns, oxidative stress is a major concern due to the increased production of free radicals during the inflammatory response. Antioxidants such as vitamins C and E, along with trace elements like selenium and zinc, play a crucial role in mitigating oxidative damage and supporting the immune system. Supplementation with these micronutrients is considered essential in the management of severe burn injuries.

5. Emerging Techniques and Future Directions

Emerging techniques in burn nutrition include the use of anabolic agents, such as growth hormone and testosterone, to reduce catabolism and improve lean body mass retention. However, these therapies are still under investigation and are not yet part of standard burn care. Additionally, ongoing research is exploring the role of probiotics in supporting gut health and immune function in burn patients.

6. Conclusion

Nutritional intervention is a cornerstone of burn management, with specific techniques and requirements varying according to burn severity. While oral nutrition and oral supplements are often adequate for mild burns, severe burns require more intensive interventions, including early enteral feeding, parenteral nutrition when necessary, and targeted micronutrient supplementation. The goal is to support the

hypermetabolic state, promote wound healing, and reduce the risk of complications. Further research is needed to refine nutritional protocols and explore innovative approaches for optimizing recovery in burn patients.

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