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The Role of Nutrition Therapy in Reducing Raw Surface Area in Severe Burn Injury Patient: A Case Report

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ABSTRACT

Medical nutrition therapy for burn patients aims to meet increased calorie needs and prevent energy-protein malnutrition due to hypermetabolic conditions. Medical nutrition therapy based on the European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines for major burn patients is expected to help reduce the extent of burns. Medical nutrition therapy is individual and aims to help wound healing, improve nutritional status, help improve metabolic status, improve clinical outcomes, improve patient quality of life, and reduce the length of hospital stay by meeting adequate energy, protein, fat, carbohydrate and micronutrient needs during patient care in the hospital.

Keywords: Severe burn injury, Nutrition therapy

INTRODUCTION

Due to a higher risk of mortality and morbidity, patients with severe burns require effective multidisciplinary care. Burn injuries can cause alterations in metabolism, weakened immune systems, raised pro-inflammatory cytokines, higher risk of infection, and even multi-organ failures. Along with pharmacological therapy, medical nutrition therapy based on the European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines for major burn patients is expected to help reduce the extent of burns. This includes 25–30 kcal/kg BW/day energy provision, protein provision of 1.5–2 g/kg BW/day, and micronutrient supplementation.

CASE REPORT

A fifty-year-old man suffered 51.5% body surface area burns on the first day of hospitalization caused by fire. The patient had completed resuscitation, appeared seriously ill, and was hemodynamically stable. The patient was hospitalized for 23 days in the intensive care unit. The provision of medical nutrition therapy based on the ESPEN guidelines included macronutrients and micronutrients given in stages and adequately according to clinical conditions, as well as debridement or wound closure with skin grafts in patients during hospitalization. Energy was given at 8–34 kcal/kg BW/day, 0.8–1.7 g/kg BW/day of

protein, 11–32% of fat, and 49–68% of carbohydrates. During the patient's hospitalization, the nutrition was in the form of a soft diet, hospital liquid food formula, and high-protein oral nutrition supplement (ONS) supplemented with multivitamins and minerals. According to the patient's clinical condition and medical actions, nutrition was given orally, enterally, and parenterally. The patient was also given micronutrient supplementation for wound healing.

DISCUSSION

Medical nutrition therapy for burn patients aims to meet increased calorie needs and prevent energy-protein malnutrition due to hypermetabolic conditions. Calculating calorie needs in burn patients uses indirect calorimetry as the gold standard. However, if the tool is unavailable, several formulas, including Xie, which was used in this patient, can be used. Medical nutrition therapy can be started within 24–48 hours after the patient experiences burns. Providing high-energy and protein nutrition can increase the composition of fat-free mass and protein synthesis. Providing carbohydrates can stimulate insulin, which helps the anabolic process in wound healing, especially during the proliferation phase.

In burn patients, proteolysis can increase. Therefore, protein supplementation is needed as a substrate to help heal wounds, improve the immune system, and reduce the loss of fat-free mass. Whey protein sources, essential amino acids, can help form collagen and maintain muscle mass. In addition, protein can support angiogenesis, fibroblast proliferation, immune function, wound contraction remodeling, and skin protein structure. Leukocytes, monocytes, lymphocytes, and macrophages require protein to improve immune function. In this patient, an ONS formula containing whey protein is given. Adequate fat provision in patients can supply additional energy in the wound healing process, including axonal myelination and lipid bilayer in cells and organ membranes during new tissue growth. Fat intake can play an important role in helping the absorption of fat-soluble micronutrients.

Micronutrient supplementation in the form of vitamins and minerals plays an important role in healing burns in patients because they can experience deficiencies in the body. Based on guidelines, as in this case, supplementation can be given for up to 14 days for patients with burns of 40-60%. Vitamin C plays a role in the stages of wound healing, including the hydroxylation of proline and lysine in collagen synthesis and immunomodulation, and functions as an antioxidant. Vitamin C deficiency can affect the immune response in the inflammatory phase by weakening the capillary walls of blood vessels and reducing collagen synthesis during the proliferation and remodeling phases, thereby increasing the risk of wound dehiscence. Vitamin C supplementation is recommended at a dose of 500− 1000 mg daily for wound healing and 1–2 g daily for severe wounds such as burns. This patient was given vitamin C 250 mg, two times daily.

Vitamin B complex contains vitamin B1 2 mg, B2 2 mg, B3 20 mg, calcium pantothenate 10 mg, and B6 2 mg, which also play an important role in various metabolic processes as an enzyme cofactor that plays a role in energy metabolism, DNA synthesis, protein, and other functions. This patient has been given a vitamin B complex 3x1 tablet. Folic acid plays a role in maintaining the function of natural killer (NK) cells and as an antibody response to antigens and Th1 cell responses. The patient was given a dose of 1 mg daily. In the wound healing stage, vitamin D can help the epithelial barrier's structural integrity and transport function, and it is expected to suppress inflammation. This patient was given vitamin D 5000 IU daily. In addition, minerals such as zinc can play a role in wound healing. Zinc provides benefits in inhibiting the production of inflammatory cytokines, preventing apoptosis as an enzyme cofactor, and increasing re-

epithelialization and collagen synthesis. Zinc deficiency can interfere with all stages of wound healing. In the inflammatory phase, it can reduce immunity and increase the risk of infection. In the proliferation phase, collagen synthesis can be disrupted. The remodeling phase can interfere with fibroblast proliferation, collagen synthesis, and epithelialization stages. This patient was given zinc supplementation at a dose of 20 mg, two times daily, to help wound healing. The patient was also given pharmacological therapy in the form of antibiotics and painkillers and underwent debridement, excision, and wound closure with skin grafts. At the end of treatment, the patient's burn area decreased to 6%.

CONCLUSION

Medical nutrition therapy is individual and aims to help wound healing, improve nutritional status, help improve metabolic status, improve clinical outcomes, improve patient quality of life, and reduce the length of hospital stay by meeting adequate energy, protein, fat, carbohydrate and micronutrient needs during patient care in the hospital.

Declaration by Authors

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