Perioperative Nutritional Support Case Study for a Patient Undergoing Gluteus Maximus Flap Transfer Surgery for Pressure Ulcer

Yujun Zhang
Department of Clinical Nutrition, Affiliated Hospital of Qinghai University, Xining 810000, Qinghai, China
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Abstract: Pressure ulcers are caused by prolonged pressure on local tissues, leading to continuous ischemia, hypoxia, and malnutrition, resulting in tissue necrosis. Patients with pressure ulcers often experience varying degrees of malnutrition due to gut flora imbalance and a hypercatabolic state. This paper documents the case of a patient with a sacral pressure ulcer admitted to the Department of Burn and Plastic Surgery of the Affiliated Hospital of Qinghai University on November 28, 2023. Clinical nutrition treatment began on the second day of admission, including dietary guidance and enteral nutrition intervention. The patient's nutritional status gradually improved, leading to a successful recovery. By reviewing the nutritional treatment process and clinical outcomes, this case study provides valuable insights into the nutritional management of pressure ulcer patients.
***Keywords*:** pressure ulcer, nutritional intervention, enteral nutrition, individualized nutritional treatment

1. Introduction

Pressure ulcers, or bedsores, are caused by prolonged pressure on tissues, leading to ischemia, hypoxia, and malnutrition, commonly affecting the sacrum and heels. Longterm bedridden patients often experience reduced gastrointestinal function, resulting in poor appetite and indigestion, which, combined with a hypercatabolic state, leads to malnutrition[1]. This paper reports a critical case of a patient with a sacral pressure ulcer and low protein levels. The patient received nutritional support during the hospital stay, successfully underwent a gluteus maximus flap transfer, and rapidly improved postsurgery, ultimately recovering and being discharged.

2. Patient Information

2.1 Patient Profile

The patient, Liu, a 53yearold male, was admitted due to paraplegia caused by trauma for over a year and a half, and the formation of a sacral pressure ulcer for seven months.

2.2 Medical History

The patient sustained a thoracic injury in July 2022, leading to paraplegia and underwent surgery (thoracic vertebra 9 burst fracture + posterior rod fixation system internal fixation + spinal canal decompression exploration + bone graft fusion surgery). The surgical wound healed well, but there was no improvement in paraplegia. In April 2023, the patient developed pressure ulcers in the sacral and gluteal regions, which he treated with hydrogen peroxide irrigation without improvement. The wound size increased, and the pressure ulcer worsened, leading to his admission to our burn unit with a diagnosis of "pressure ulcer in the pressure area and paraplegia".

Past Medical History: In August 2023, the patient had a bladder surgery for catheterassociated urinary tract infection.

Specialty Examination: The sacral pressure ulcer measured approximately 15 cm by 15 cm with significant black necrotic tissue and purulent discharge, emitting a foul odor. A 7 cm by 7 cm pressure ulcer was observed on the right gluteal region, approximately 2 cm deep. Scattered pressure ulcers were seen on the left hip, presenting a bright red appearance, and a 3 cm by 2 cm pressure ulcer on the left heel with a dry, scabbed wound.

3. Nutritional Diagnosis and Treatment

3.1 Clinical Diagnosis

Upon admission, the patient was diagnosed with: Pressure ulcer in the pressure area; Paraplegia; Postsplenectomy; Postthoracic vertebra fracture surgery; Postcystostomy; Soft tissue infection.

3.2 Nutritional Assessment

1. Dietary Survey: Breakfast (220ml milk, 150g steamed bun, 40g egg), lunch (one chicken leg, 150g noodles, 50g vegetables), dinner (100g steamed bun). Total daily caloric intake was approximately 1360 kcal, based on a 24hour dietary recall from the patient and family.

2. Anthropometric Measurements: Height 170 cm, weight 63 kg, BMI 23.9 kg/m².

3. Nutritional Scale Assessment: SGA assessment indicated a BC grade, suggesting moderate to severe malnutrition.

4. Nutritional Diagnosis: Severe proteinenergy malnutrition.

3.3 Nutritional Treatment Process

The patient was admitted on November 28, 2023. Upon admission, NRS 2002 screening indicated malnutrition risk with lab results: total protein 58.2 g/L, albumin 23.9 g/L, hemoglobin 96 g/L. A clinical nutrition consultation was requested, and treatment began on November 29, targeting 16251950 kcal/day and 94.5126 g protein.

November 29 December 3: Treatment included 15 g/day whey protein (80% protein) and 15 g/day glutamine (95% protein). December 4: Lab results: total protein 61.9 g/L, albumin 33.4 g/L, hemoglobin 100 g/L. No gastrointestinal issues; whey protein increased to 25 g/day. December 11: Lab results: total protein 67.8 g/L, albumin 34.7 g/L, hemoglobin 117 g/L. Slight abdominal distension; treatment continued. December 18: Surgery planned for December 20. Preoperative nutrition enhanced: whey protein 25 g/day, glutamine 15 g/day, special formula food 25 g/day. Lab results: total protein 73.5 g/L, albumin 38.4 g/L, hemoglobin 139 g/L. December 20: Surgery performed. Enteral nutrition resumed on postoperative day 2. Lab results: total protein 75.1 g/L, albumin 38.2 g/L, hemoglobin 152 g/L. December 25: Lab results: total protein 57.8 g/L, albumin 33 g/L, hemoglobin 115 g/L. Poor appetite; adjusted to standard homogenate 120 g/day, whey protein 25 g/day, glutamine 15 g/day, special formula food 25 g/day. December 29: Lab results: total protein 57.8 g/L, albumin 30.6 g/L, hemoglobin 104 g/L. Protein levels declined; continued current treatment. January 3, 2024: Lab results: total protein 66.9 g/L, albumin 35.9 g/L, hemoglobin 120 g/L. Appetite adequate; continued with standard homogenate 120 g/day, whey protein 25 g/day, glutamine 15 g/day, special formula food 25 g/day. January 8, 2024: Lab results: total protein 69.7 g/L, albumin 37.5 g/L, hemoglobin 130 g/L. Oral intake increased; adjusted to standard homogenate 120 g/day, whey protein 25 g/day, glutamine 15 g/day. January 15, 2024: Lab results: total protein 69.2 g/L, albumin 40.7 g/L, hemoglobin 141 g/L. Oral intake met 60% of target; adjusted to standard homogenate 80 g/day, whey protein 25 g/day, glutamine 15 g/day. January 19, 2024: Lab results: total protein 69.4 g/L, albumin 38.9 g/L, hemoglobin 144 g/L. Adjusted to whey protein 25 g/day, glutamine 15 g/day. January 30, 2024: Lab results: total protein 69.2 g/L, albumin 39.6 g/L, hemoglobin 118 g/L. Postoperative wound healing was good; concluded nutritional treatment with dietary advice. Treatment lasted 63 days.

4. Discussion

4.1 Accurate Nutritional Risk Screening and Assessment

Accurate nutritional risk screening and assessment for hospitalized patients are crucial for preventing and intervening in malnutrition[2]. Studies have shown that[3] early enteral nutrition after burns can reduce intestinal ischemia, stimulate the intestinal mucosa, improve blood perfusion, and protect the mucosal barrier. Upon admission, the attending physician conducted an NRS 2002 nutritional risk screening for this patient, scoring 4 points, indicating a malnutrition risk. Consequently, a clinical nutrition consultation was promptly requested, and enteral nutrition support was provided within 24 hours, significantly improving the patient's nutritional status and mucosal protection. This enabled the patient to meet surgical indications quickly and successfully undergo surgery. Accurate assessment and early nutritional intervention for atrisk patients enhance clinical diagnosis and treatment and improve perioperative nutrition levels. The concept of valuebased care (VBC), proposed by Porter ME et al.[4] in 2006, focuses on improving medical outcomes at the same or lower costs by enhancing quality, safety, patient experience, and costefficiency. In this case, timely nutritional treatment significantly shortened the patient's hospital stay, reduced financial burden, and improved postoperative quality of life[5].

4.2 Individualized Nutritional Treatment

Individualized nutritional treatment, with different plans at various stages, is optimal for managing patient care. On the first day of admission, a 24hour dietary recall indicated a total intake of about 1360 kcal with a macronutrient distribution of 5% protein, 15% fat, and 80% carbohydrates. The patient's energy intake was 76% of the target, so they were advanced to the second step of treatment, which included diet and oral enteral nutrition supplements. Dietary adjustments provided 1568 kcal with 12% protein, 20% fat, and 58% carbohydrates, encouraging balanced, highprotein meals.

Adjustments were made based on intake, condition, and gastrointestinal tolerance. From days 15, the patient met 90%

of their caloric needs and received 42.9 kcal and 25.5g protein. On day 6, protein intake was insufficient, so the dosage was increased to 100 kcal and 33.5g protein. Despite occasional bloating reported on day 8, the original plan continued. After 14 days, protein levels rose, leading to a preoperative plan of 200 kcal and 33.5g protein. Postoperatively, due to high protein consumption and low dietary intake, the plan was adjusted to include 717.2 kcal and 53.9g protein. After 20 days, protein levels increased, allowing for a gradual reduction in enteral nutrition. The plan was adjusted to 544.8 kcal and 47.1g protein. As the patient's nutritional indicators normalized, enteral nutrition was further reduced, and normal diet resumed, with a focus on full diet and health education.

The patient had significant hypoproteinemia (albumin 23.9 g/L) at admission, complicating pressure ulcer recovery and infection control. A treatment plan involving dynamic adjustments to intravenous human albumin and individualized nutrition therapy yielded significant results. Individualized nutritional treatment, based on scientific diet, balanced ratios, and dynamic adjustments, achieved ideal outcomes in this case[6]. Studies have shown that individualized nutritional interventions and management based on patient differences can lead to optimal treatment effects, as demonstrated by the improvement in this patient’s nutritional indicators and overall health[7].

4.3 Patient Compliance and Cooperation with Clinical Physicians

Patient compliance and cooperation with clinical physicians are crucial for effective nutritional treatment. This paraplegic patient, bedridden due to trauma, initially had low compliance and a negative psychological outlook. Studies show that long-term bedridden paraplegic patients often face significant psychological stress, leading to reluctance in cooperating with medical staff, affecting recovery[8]. Persistent pressure ulcers can lead to secondary infections and life-threatening conditions. After family persuasion and admission, the patient received repeated psychological support[9]. Escherichia coli was detected in the patient’s secretions on the first day, making infection control a priority. With daily psychological counseling from the nutritionist and attending physician, the patient's compliance improved from 50% to 100%, significantly promoting recovery. The patient's albumin level increased from 23.9 g/L at admission to 39.6 g/L at discharge, aiding pressure ulcer healing[10].

5. Conclusion

Pressure ulcers are common in longterm bedridden patients. Without prompt identification and management, they can prolong hospital stays, increase costs, and cause serious complications. Studies show that malnutrition and protein deficiency are key factors in the development of pressure ulcers. Early nutritional assessment and intervention can improve malnutrition, aid in the diagnosis and treatment of pressure ulcers, and enhance the patient's quality of life. In this case, timely nutritional assessment, individualized treatment, and active management of the primary disease were crucial for successful nutritional therapy.

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