

Role of Nutrition Support in Improving Serum Pre Albumin Level and its Outcome on Wound Healing in a Burn Patient – A Case Report

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Abstract:- Management of burns requires multidisciplinary approach with efforts from various specialty teams like physicians, nurses and allied health professionals like dietitians, physiotherapists etc. The dietetic team has a defined and mandatory role in the care of the burn patients, from the acute phase followed through rehabilitation. Prealbumin is a versatile nutritional parameter compared to serum albumin and the most significantly correlated factor to graft healing in burn wounds. This case report describes about the importance of providing adequate nutrition support delivery in improving prealbumin status and its outcome on wound healing.

Keywords:- Pre albumin, wound healing, TBSA, MNT.

I. INTRODUCTION

Nutrition is an important parameter of treatment of patients with deep burns injury. More nutrients are required for burn patients due to hyper catabolic state and failure to meet the nutrient demands can cause delayed wound healing. All patients with deep burn injury have to be assessed by a dietitian to establish nutritional intervention. Assessment and nutrition intervention is imperative for patients with burns. Nutritional support must be assessed individually and have to be implemented, monitored and adjusted throughout recovery.

The most commonly used parameters to assess the nutritional status of a burn patient are prealbumin, serum albumin, body weight, nutrients like calorie and protein intake recall. Pre-albumin, a visceral protein is assumed to be a better indicator than serum albumin due its short half-life usually 2-3 days¹. This is more responsive to nutritional changes. A low prealbumin concentration is a key indicator to identify the patients who are at nutrition risk.

II. CASE REPORT

A 34 year old female was admitted with complaints of flame burns. Patient was found to have 14 % Total Body Surface Area (TBSA) of second degree superficial to deep burn injury involving chest and abdomen, right upper & lower limb and left lower limb. There were no other comorbidities like diabetes, heart disease, hypertension etc. Patient underwent wound debridement and skin grafting.

Her vitals were stable following grafting. She was started on empirical treatment protocol and investigations were done accordingly.

On the third day of grafting, she started having high spikes of fever for which she was started on necessary medications. However, she continued to have fever and also developed hypotension. Investigations revealed central line induced septicaemia for which the central line was changed and hypotension was corrected with necessary medical management. Patient was referred to dietitian to improve on the protein status as the serum pre albumin level was low (1 mg/dl) and to promote rapid wound healing.

III. NUTRITIONAL INTERVENTION

• Nutritional assessment:

Nutritional status is an important factor in graft healing. One of the greatest threats to survival for burn patients is infection, and because of the relationship among nutrition, immunity and wound healing, optimal nutritional support is extremely important to these patients².

Nutrition assessment is mandatory to provide adequate nutrition support. Patient's height and weight details, relevant biochemical parameters were obtained from the hospital record. Patient's usual diet pattern intake was collected. Twenty four hour dietary recall was done to know the current food intake of the patient (Table 1). During assessment, it was found that the patient was having diarrhoea.

Anthropometry	Measurements
Height (cm)	150
Weight (Kg)	59
BMI (kg/m ²)	25.6
Biochemical	
S. Pre albumin (mg/dl)	11
Dietary: Actual Intake	
Energy (Kcal)	1400
Protein (g)	50

Table 1. Nutritional assessment

IV. CALORIE AND PROTEIN REQUIREMENTS

The primary goal of medical nutritional therapy (MNT) is to deliver more calories in burn patients. During hyper metabolic stress, the caloric requirements are very high and it has to be addressed without overfeeding the patients. Curreri formula was used to calculate the estimated requirements of energy to initiate the nutritional support^{3,4}.

Providing enough protein is an extremely important part of nutritional support. This avoids depletion of skeletal muscle amino acid and helps sufficient protein synthesis for optimal wound healing and immune function. Measurement of serum proteins such as albumin and prealbumin are the parameters utilized to assess nutritional status. The requirements of protein was calculated as per ASPEN guidelines.

V. NUTRITIONAL SUPPLEMENT

There is increased demand for nutrients due to hyper catabolic state. It is very difficult to achieve high protein requirement of the patient through solid diets. Hence to meet up the nutrient demand, enteral nutritional supplements were given along with soft solid diet. Enteral supplements are the most effective source of nutrition support to improve the protein status of patients with burns. Cost effective home based enteral supplement was planned over commercial supplements to this patient. The composition of the enteral supplement is as shown in Table 2.

Ingredients	Volume	Energy (kcal)	Protein (gm)
Cereal flour, whole milk, skimmed milk solids, sugar and few other ingredients.	1200 ml	1350	70

Table 2 . Composition of the Enteral Supplement

VI. ADMINISTRATION OF NUTRITION SUPPORT

A total of 1200 ml home based enteral supplement at the rate of Q3H was introduced along with soft solid diet such as well mashed cereals, soft dhal, bland mashed vegetables and mashed fruits etc which was well tolerated. These preparations were slowly introduced on a daily basis after closely monitoring the tolerance of the patient by the dietitian on a daily basis to meet the energy requirements. Subsequently to improve the protein requirement egg custards, soft scrambled egg, bland minced chicken or fish were slowly introduced as per the tolerance. Micronutrient supplementation was also prescribed by the physician. The desired protein requirement of 120 gm / day was achieved on the fourth day of initiation of nutrition intervention along with soft solid diet which is shown in Table 3.

Day	Total Energy (kcal)	Total Protein (gm)	Solid Diet (Energy)	Solid Diet (Protein)	Enteral Supplement (Energy)	Enteral Supplement (Protein)
1	1400	40	1050	22	350	18
2	1800	80	1100	45	700	35
3	2200	130	850	30	1350	100
4-7	2600	120	1250	50	1350	70
8 – till discharge	2800	140	1450	70	1350	70

Table 3. Gradual Stepping of Nutrients

VII. RESULTS AND DISCUSSION

When the nutrition care was handed over to the dietitian, the primary MNT goals were to prevent diarrhoea and promote rapid wound healing. During the initial dietary assessment it was found that the food intake of the patient was inadequate to cope up with the hypermetabolic stress. Improving the food intake was a real challenge to the dietitian as the patient had multiple episodes of diarrhoea. The patient also needed a great deal of support by the multidisciplinary team since the patient was physically incapacitated and emotionally traumatized⁵. More than prescribing diet for the patient, dietitian’s predominant role was to counsel the patient adequately and to make understand the patient about the importance of adequate food intake in wound healing before starting nutrition therapy. Patient was started on hospital diet to control diarrhoea and to provide adequate nutrition support. High calorie, high protein home based enteral supplement along with soft solid diet to deliver adequate energy and protein was started. To achieve adequate amount of energy and protein through soft solid diet cereals, dhal, eggs, fish, chicken, and milk were slowly introduced on a daily basis in the diet. The quantity of ingredients used in home based enteral supplement was slowly graded up to deliver appropriate nutrition support. Patient coped up well with the nutrition management planned. Diarrhoea subsequently settled after initiation of hospital diet and patient started consuming well. Several studies reveal that early enteral nutrition support in burns has demonstrated numerous advantages such as increased calorie intake, protein retention, improved bowel mucosal integrity and decreased incidence of stress gastritis⁶. Pre-albumin levels are now considered the gold standard for assessing and monitoring nutritional status of a patient. In this case, through early initiation of enteral supplement, pre albumin level was improved from 11 mg to 19 mg in about two weeks and in addition to that the wound was also healing rapidly as expected by the medical team.

VIII. RECOMMENDATIONS DURING DISCHARGE

At the time of discharge, she was hemodynamically stable. She was afebrile and no episodes of diarrhoea. She was tolerating diet well. Wound was also healing well with clean donor site.

The hypermetabolic state can persist for over a year burn injury, hence it becomes extremely important that patients should continue receiving adequate nutrition support even after discharge. Effective assessment and delivery of nutritional support is an important factor which can optimize wound healing and decrease complications and improve mortality. High calorie, high protein diet along with home based enteral supplement was counselled by dietitian considering the patients usual diet pattern, food preferences etc. Patient was also explained in detail on the importance of continuing high protein diet till her next review. Meticulous planning and implementation of nutrition support would definitely promote rapid wound healing.

REFERENCES

- [1]. Seung Hui Lim, Jong Seok Lee, Sang HeeChae, Bo Sook Ahn, Dong Jin Chang, and Cheung Soo Shin. Prealbumin is Not Sensitive Indicator of Nutrition and Prognosis in Critical Ill Patients. *Yonsei Med J.* 2005 Feb 28; 46(1): 21–26.
- [2]. Deitch EA. Nutritional support of the burn patient. *NutrCrit Ill Pat* 1995; 11: 735-50.
- [3]. Ireton-Jones CS, Turner Jr WW, Liepa GU, Baxter CR. Equations for the estimation of energy expenditures in patients with burns with special reference to ventilatory status. *J Burn Care Rehabil.* 1992;13(3):330–PubMedViewArticleGoogle Scholar.
- [4]. Curreri PW. Assessing nutritional needs for the burned patient. *J Trauma.* 1990;30(12 Suppl):S20–3.PubMedView ArticleGoogle Scholar.
- [5]. Audra ClarkJonathan Imran, Tarik Madni, and Steven E. Wolf. Nutrition and metabolism in burn patients. *Burns Trauma.* 2017; 5: 11.
- [6]. Mosier MJ, Pham TN, Klein MB, Gibran NS, Arnoldo BD, Gamelli RL, Tompkins RG, Herndon DN. Early enteral nutrition in burns: compliance with guidelines and associated outcomes in a multicenter study. *J Burn Care Res.* 2011 Jan-Feb;32(1):104-9.

Author's contributions

MB conceived of the presented idea and developed the paper. RS encouraged the author and provided critical inputs. All authors discussed the entire paper and contributed to the final manuscript.