



THE EFFECTS OF PREOPERATIVE NUTRITIONAL MEASUREMENTS IN WOUND HEALING AFTER HIP FRACTURE IN THE ELDERLY - A PROSPECTIVE STUDY

Orthopaedics

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KEYWORDS

BACKGROUND

Elderly people frequently exhibit malnutrition, which appears to be more severe in hip fracture patients than in the general ageing population. It is generally known that low nutrition leads to incomplete and insufficient wound healing. In 40 elderly patients who underwent hip surgery, we looked at the relationship between various factors related to preoperative nutritional status and delayed healing of the surgical wound.

This study aims to assess the validity of the RMNI (Rainey MacDonald nutritional index) and MNA (mini nutritional status) [<17 – Malnourished; $17-23.5$ – At Risk Of Malnutrition; ≥ 24 – Normal] in hip fracture patients.

Other nutritional indicators examined include blood albumin, serum transferrin, TLC, and wound healing status. Decreased lymphocyte count (N: 1000-4800 /ml blood) impairs the ability of the immune system to eradicate or prevent infection.

Albumin (N: $3.4 - 5.4$ g/dL), prealbumin (N: $15-36$ mg/dL), and transferrin (N: $215-380$ mg/dL) are visceral proteins that are sensitive indicators of marginal nutrient deficiency, and they can be used to detect acute nutritional changes by virtue of their short half-lives. Transferrin is serum reactant that has been used for nutritional screening. It is decreased in protein-energy malnutrition.

INTRODUCTION

In the population older than 60 years, fracturing of a hip is one of the commonest reasons for being admitted to a hospital. Age-related changes increase the risk of perioperative complications⁶. Numerous authors have shown that patients with hip fractures who have surgery have worse results because malnutrition is more common among the elderly. Prior to surgery, poor nutrition can increase the risk of perioperative problems such as wound infections or even death. Despite widespread agreement on this point, it is less apparent what the main indicator for malnutrition.

Various preoperative parameters and nutritional equations have been used to predict postoperative wound-healing status⁶. Several laboratory markers have been proposed as indicators of inadequate nutrition. The more popular markers among them are albumin, transferrin, and total lymphocyte count (TLC). However, this link seems to receive too little attention in current clinical practice.

Serum albumin level, total lymphocyte count, serum transferrin, and haemoglobin count (Normal value: $13.2-16.6$ g/dL for males; $11.6-15$ g/dL for females) are some of the preoperative variables and nutritional equations that have been used to predict postoperative wound-healing status¹¹.

These are simple, repeatable tests that are available for most surgical patients. In this hospital setting, the mini-nutritional assessment (MNA) is a helpful diagnostic tool for identifying elderly patients who are malnourished or at risk of becoming malnourished¹⁰.

Nutritional evaluation and the effects of malnutrition on orthopedic surgical patients have not received much attention, particularly in some developing nations. To identify the impact of preoperative

nutritional condition more clearly on postoperative wound healing in elderly patients having hip surgery, we conducted a prospective study. The study established the utility and validity of MNA in elderly hip fracture patients as well as the relationship between several nutritional factors and wound healing.

MATERIALS AND METHODS

40 hip fracture patients over the age of 60 who underwent surgery at the Basaveshwara Medical College between January 2021 and April 2022 were included in prospective study. All these patients had been identified as having isolated hip fractures. The study was carried out only after receiving approval from ethical committees, and all participants provided written agreement.

Patients with pathological fractures, osteopathies other than osteoporosis, young patients with hip fractures requiring revision surgery, patients with mental impairment, and patients for whom trustworthy communication was not available were excluded from the study.

Data Collection

The measures used to determine nutritional status were serum albumin (ALB), serum transferrin (TRA), and total lymphocyte count (TLC) levels after the admission. Patient data obtained included age and gender. MNA survey results where two surgeons scored the patient before surgery. The MNA scoring framework included a preliminary screening segment was followed by a more thorough evaluation for subjects who less than an 11 on the first screen. All patients had the MNA completed for the study's purposes.

The same set of surgeons operated on each patient, and prophylactic antibiotics were given to each patient. All patients received prophylactic antibiotics intravenously within one hour of the incision, consisting of one gram of ceftriaxone every twelve hours or, in the case of a penicillin allergy, one gram of vancomycin every twelve hours, and continued for 24 hours following surgery or until the post-operative drains were removed, which was typically on the second postoperative day. Wound inspection started on the first postoperative day. On the 14th or 15th postoperative day, sutures were removed.

Incision wound drainage that persisted for at least two days or the separation of the wound margins to a breadth and length larger than one centimeter were both considered signs of delayed wound healing.

Statistical Analysis

The data will be presented as Mean, $\pm$ SD, and diagrams. Data will be analyzed using appropriate statistical tests like Chi-square test and Z test etc. Data will be compiled in MS Excel spread sheet and analyzed using SPSS version 20, and p value 0.05 is considered as significant.

RESULTS

There were 32 occurrences of intertrochanteric fractures and 8 cases of femoral neck fractures among the 16 males and 24 females, with an average age of 78.225 years (62-91 years). Hemiarthroplasty was used to treat patients with fractures of the femoral neck, trochanteric fracture patients received Proximal femoral nailing.

There were 11 instances of slow wound healing, and each one involved

a superficial wound infection. Intravenous antibiotics were successfully administered to treat them. There were no cases of deep wound infection.

In the delayed wound healing group (Group2), the mean nutritional parameters were lower than those observed in the normal wound healing group (Group1), with the difference statistically significant for TRA, TLC, and MNA total score (Table 2). Additionally, a substantial difference between the age and co-morbidities of the two groups was discovered. For albumin, Pre-albumin, gender, or fracture type, no noteworthy differences were found. Delay in wound healing and TLC values were shown to be significantly related when all variables were subjected to multivariate logistic regression analysis (OR 0.332; CI 0.144-0.767; P0.01).

		Wound Healing		p-value
		Normal	Delayed	
Age	< 80 years	2±1.2	14±1.4	0.0001
	≥80 years	9±1.6	15±1.8	<0.0001
Gender	Males	3	13	
	Females	8	16	
Co-morbidities	Diabetes	3	3	
	IHD	0	5	
	Hypertension	2	7	
	Others	1	3	

Mean (SD)	Wound Healing		p-value
	Normal (n=29) Group 1	Delayed (n=11) Group 2	
Age in years	79.17±10.18	83.3 ±12.2	0.28
Hemoglobin (gm/dl)	9.91±1.23	10.74±1.1	0.057
Albumin (gm/dl)	3.56±0.32	2.8±0.34	0.001
Transferrin (mg/dl)	241.17±21.63	220.82±24.4	0.0143
TLC	1245.66±465.12	890.12±475.75	0.038
MNA score	21.93±1.92	19.2±1.8	0.0001
Days in hospital	8.17±1.55	9.82±2.87	0.0219

Albumin (gm/dl)

Wound Healing Normal (n=29) Group 1
Wound Healing Delayed (n=11) Group 2

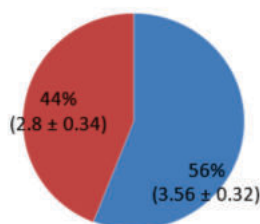


Fig 1. Depicts That Wound Healing Is Faster In Group 2 Patients Than In Group 1 Patients Who Had Preoperative Hypoalbuminemia

Transferrin (mg/dl)

Wound Healing Normal (n=29) Group 1
Wound Healing Delayed (n=11) Group 2

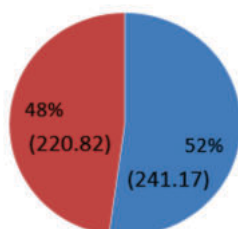


Fig.2. Depicts That 48 Percent People Who Had Decreased Transferrin Levels Had Delayed Wound Healing

TLC

Wound Healing Normal (n=29) Group 1
Wound Healing Delayed (n=11) Group 2

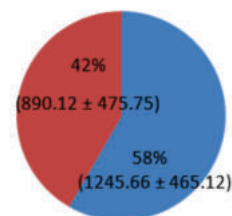


Fig 3. Depicts That Wound Healing Is Faster In Patients With Higher Tlc Compared To Group 2 Patients Who Had Low Tlc

MNA score

Wound Healing Normal (n=29) Group 1
Wound Healing Delayed (n=11) Group 2

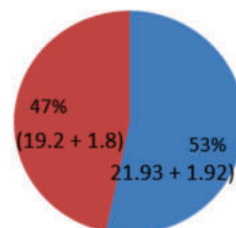


Fig 5. Depicts That Wound Healing Is Faster In Patients With High Mna Score Compared To Patients With Low Mna Score

Days in hospital

Wound Healing Normal (n=29) Group 1
Wound Healing Delayed (n=11) Group 2

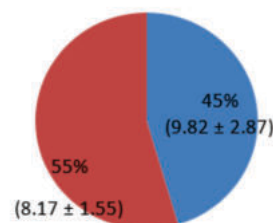


Fig 6. Depicts That Group 2 Patients Had Extended Stay In The Hospital Compared To Group 1 Patients

DISCUSSION

Malnutrition is a major issue, and malnourished patients may experience lengthy hospital stays that are made more difficult by an increased risk of infection and wasting. Furthermore, because fractures are linked to higher rates of catabolism, an under-nutrition condition in an orthopaedic patient is likely to worsen. The most accessible and frequently used biomarkers for the prediction of postoperative problems in orthopedics were examined in this investigation, including blood albumin level 3.5 g/dL, TLC 1500 cells/mm³, and BMI.

This study examined 40 patients who had hip operations at the Basaveshwara Medical College and Hospital and assessed the relationship between preoperative nutritional status biomarkers and

in-hospital postoperative problems. In There was a significant correlation between decreased albumin levels and malnutrition with post-operative complications in a prospective study by Mark R. Foster, R. Bruce Heppenstall, et al¹ and there was a significant correlation between decreased albumin levels and malnutrition with post-operative complications in our study as well.

Total lymphocyte count, albumin, and postoperative problems were significantly correlated in a study by Kenneth A. Greene, MD, Alan H. Wilde, et al² and in our study, there was a strong correlation between TLC and post-operative problems and decreasing albumin levels.

There was a strong correlation between decreased albumin and obesity class 2 and periprosthetic joint infections, according to a study by Sheryl Lok-Chi Man, Wai-Wang Chau, and colleagues³. Furthermore, a strong link was found in our study between decreased albumin and delayed wound healing.

Preoperative lymphocyte count and postoperative wound healing were significantly correlated in a study by Luis A. Marn, José A. Salido, and colleagues⁴. A similar strong correlation between preoperative lymphocyte count and postoperative wound healing was seen in our investigation.

There was a strong correlation between preoperative lymphocyte count, serum transferring levels, dietary condition, and postoperative wound healing, according to a study by Jiong Jiong Guo, M.D., Huilin Yang, M.D., et al⁵. Similar to our research, there is significant relation between preoperative lymphocyte count, serum transferring levels, nutritional status and post operative wound healing.

In a study conducted by Chukwuemeka Mbagwu, MD, Matthew Sloan, MD, MS et al. there was a significant relation between preoperative decreased albumin, serum transferring level and post operative wound healing⁶. And in our study too there was significant relation between preoperative decreased albumin, serum transferring levels and post operative wound healing and in our study too there was significant relation between preoperative decreased albumin, serum transferring levels and post operative wound healing.

In a study conducted by Brendan M. Paterson, M.D. Charles N. Cornell. M.D there was a significant relation between preoperative decreased albumin, serum transferring levels, TLC levels and post operative wound healing⁷. Similarly in our study too there was significant relation between preoperative decreased albumin, serum transferring levels, TLC levels and post operative wound healing.

In a study conducted by Alpaslan Öztürk, Yüksel Özkan there was a significant relation between preoperative decreased albumin, TLC levels and wound healing⁸, and in our study too there was significant relation between preoperative decreased albumin, TLC levels and post operative wound healing.

In a study conducted by Murphy, M., Brooks, C., New, S. et al , there was a significant relation between MNA scoring in hospitalized patients⁹, and in our study too there was significant relation between preoperative MNA profile and post operative wound healing.

CONCLUSION

Our study concludes that there is significant correlation between the effects of blood albumin on the elderly hip fracture patient. And similar results were found with effects of serum transferrin and total lymphocyte count on post operative wound healing in elderly hip fracture cases included in this study. Although long term study with more sample size is required for further establishment of co-relation.

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