Evaluation of Nutritional Status in Fracture Healing of Elderly Patients

Aaqib Qureshi¹, Gajanan Pisulkar²

^{1,2} Department of Orthopaedics, Jawaharlal Nehru Medical College,
Datta Meghe Institute of Medical Sciences, Sawangi, Wardha, Maharashtra, India.

ABSTRACT

BACKGROUND

Malnutrition is a usual problem in hospitalised elderly population, although it is not always recognised by health professionals. A mean rate of clinical and subclinical malnutrition of 42.4 % per patient was observed in patients who underwent orthopaedic surgical procedures. It has been shown that trauma and major surgery cause malnutrition and loss of immunocompetence. This study was done to evaluate nutritional status, evaluate the period of union clinically and radiologically and find the association between malnutrition and fracture healing in elderly patients.

METHODS

This prospective observational study was done on 300 patients for a duration of 2 years. Nutritional status was assessed by malnutrition universal screening tool (MUST) criteria. Patients were reassessed at 1, 3, and 6 months for functional status, MUST score, haemoglobin level, and outcome of the patient.

RESULTS

The most common age group amongst population was 50 to 60 years (42.67 %). The most common clinical diagnosis (fracture site) was fracture of femur (46.67 %) followed by tibia fracture (11 %). Most patients had body mass index (BMI) between 18 - 25 (42 %). There was significant improvement in mean haemoglobin and BMI levels postoperatively as compared to preoperative values. Also, statistically significant difference was found in pre- and post-operative MUST scores.

CONCLUSIONS

Prevention of malnutrition could be related to a decrease in fracture incidence and a better functional recovery after fracture. Risk of malnutrition is very high and is related to decreased functional recovery and care of senior citizens.

KEY WORDS

Fractures, Nutritional Level, Outcome

Corresponding Author:

*Dr. Aaqib Qureshi,
Department of Orthopaedics,
Jawaharlal Nehru Medical College,
Datta Meghe Institute of Medical Sciences,
Sawangi, Wardha, Maharashtra, India.
E-mail: q.aaqib@gmail.com*

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BACKGROUND

Malnutrition is a usual problem in hospitalized elderly population, although it is not always recognized by health professionals. A mean rate of clinical and subclinical malnutrition of 42.4 % per patient was observed in patients who underwent orthopaedic surgical procedures. The least rate of nutritional depletion was observed in patients who went for Total Hip Arthroplasty (28.6 %), followed by elective surgery (35.3 %) and patients with multiple injuries and proximal femur fractures (58.6 % per centimetre). It has been shown that trauma and major surgery cause malnutrition and loss of immunocompetence. The decrease in fracture healing process in geriatric patients is due to various factors such as diabetes mellitus, anaemia, behavioural changes and osteoporosis. Malnutrition is an issue and dietary factors do influence the physiological pathways of aging and life expectancy. Various factors such as Vitamin D, calcium and antioxidants do play a major role in decreasing bone loss and healing of the affected individuals.^{1,2}

A fracture which is related to disruption of bone integrity, the stoppage of blood supply and damage to bone marrow architecture, like all other wound repair responses, fracture healing is initiated through the induction of an innate immune response.^{3,4} Patients are screened in Acharya Vinoba Bhave Rural Hospital (AVBRH) for nutritional status deterioration due to multiple causes: their own acute pathology, the focused assessment with sonography for trauma (FAST) required for the multiple diagnostic and therapeutic processes to which they are subjected, changes in hospital feeding with respect to the diet to which they are accustomed, temperature and presentation of the food, etc. Also, it is of paramount importance to consider the prior nutritional status, sometimes precarious, in elderly patients living alone.

It has been postulated that malnutrition is a factor that increases the tendency to suffer falls. Its causes are loss of muscle mass and strength and decrease of adipose panicle. One of these complications, highlighted by its poor evolution, is the appearance of pressure ulcers. Given the prevalence of this pathology and associated health expenditure, it would be useful to seek the connection between nutritional status and the length of hospital stay after surgery. In this sense it is important to identify possible risk factors for malnutrition in this group (50 - 90 years) of patients. Modifications of the neuropsychological state or mobility, which are evaluated in methods of nutritional assessment for the elderly (Mini-Nutritional Assessment -MNA).

Malnutrition is a major problem in our country, and it has a severe impact on our health. Evaluation of nutritional status in fracture healing of elderly patients is important to know how nutrition affects the fracture healing, and its effect on clinical and radiological union of fracture as well as its functional outcome.

METHODS

This prospective observational study was done on 300 patients in the Department of Orthopaedics at Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe) for a duration of 2

years (September 2017 to August 2019). Patients satisfying the inclusion criteria were enrolled after obtaining their written consents for participation in this study. Necessary Clinical and haematological investigations of the enrolled patients were conducted.

Inclusion Criteria

- Patients between 50 - 90 years entering the traumatology service to undergo elective surgery and treatment of fractures in orthopaedics department of Acharya Vinoba Bhave Rural Hospital, Wardha.

Exclusion Criteria

- Patients with a hospital stay of less than 24 hours
- Patients admitted to beds of orthopaedics with different pathologies in charge of the care of other services,
- Trauma patients admitted to other services (intensive care unit).
- Patients having history of systemic diseases affecting normal healing.
- Patient who underwent major surgery with severe blood loss within past 6 months.

In this study 300 patients who fulfilled the inclusion and exclusion criteria and who gave a written informed consent were considered for study. The ethical clearance was obtained from Institutional Ethics Committee of Data Meghe Institute of Medical Sciences.

Method of Collecting Data

Prior informed consent was obtained before evaluating each patient. Detailed history about the disease from the patient was obtained. Clinical evaluation was done preoperatively and follow-up at 1 month, 3 months, 6 months' intervals regarding pain, union and the functional outcome were evaluated using MUST score.

Malnutrition Universal Screening Tool (MUST)

The MUST is a malnutrition screening tool in geriatric patients in the hospital setting. The MUST measures the BMI status, unintentional weight loss around 5 -10% in previous 3-6 months, and acute illness in a patient, who could not eat over 5 consecutive days. Comparing to the others is an easy tool, has high reliability to detect protein-energy malnutrition and could predict the risk of malnutrition incidence in the future. The maximum MUST score is 6, where 0 point indicates low risk, score =1 as moderate risk, and score ≥ 2 indicates a high risk of malnutrition

The malnutrition universal screening tool (Figure 1) is used as a tool to detect malnutrition and we followed the NICE guidelines for 'Nutritional Support in Adults' in February 2006. MUST is a 5-step tool to detect malnutrition. It may be used for both under as well as over nutrition, here we are referring it for under nutrition. MUST screening scores show that due to complications associated with malnutrition, adequate early nutritional intervention improves outcomes and may reduce visits to doctors and hospital admissions. (MAG, 2003 BAPEN).

Figure 1: MUST Steps of Malnutrition Universal Screening Tool (BAPEN)

Summary of the 5 MUST Steps

Step 1.

Measure height and weight to get a BMI score using chart provided. If unable to obtain height and weight, use the alternative

Step 2.

Procedures shown in this guide.

Step 3.

Note percentage unplanned weight loss and score using tables provided.

Step 4.

Establish acute disease effect and score.

Step 5.

Add scores from steps 1, 2 and 3 together to obtain overall risk of malnutrition.

Step 6.

Use management guidelines and / or local policy to develop care plan.

RESULTS

Type of Treatment	Frequency	%
Open Reduction and Internal Fixation (ORIF)	33	11.00
Closed Reduction and Internal Fixation (CRIF)	267	89.00
Total	300	100

Table 1: Type of Fracture Treatment (Reduction and Fixation)

As seen in the above table, closed reduction was the most common mode of treatment in 89 % of study population followed by 11 open reduction.

Follow-Up Hemoglobin	Mean	SD
Preoperative	8.3	1.4
1month	9.01	2.1
P value	0.34	
3 month	9.36	2.7
P value	0.67	
6 month	10.45	3.4
P value	0.01	
Follow-Up BMI	Mean	SD
Preoperative	19.34	3.4
1month	20.1	3.8
P value	0.35	
3 month	21.9	4.5
P value	0.01	
6 month	22.1	5.3
P value	0.01	

Table 2: Follow-Up Hemoglobin and BMI

As seen in the above table, there was a significant improvement in mean haemoglobin levels at 6 month interval as compared to preoperative values.

Final Functional Outcome	Low Risk	Medium Risk	High Risk	Total
Excellent	26 %	2 %	1 %	29 %
Good	17 %	5 %	1 %	23 %
Fair	18 %	11 %	6 %	35 %
Poor	1 %	2 %	10 %	13 %
Total	62 %	20 %	18 %	100 %

Table 3: Final Functional Outcome vs. MUST Score

Also, there was a significant improvement in mean BMI levels at 3-months- and 6-month-intervals as compared to preoperative values. As seen in above table 29 % of population had excellent outcome followed by 23 % with good outcome.

MUST Score	Preoperative	Postoperative at 1 Month	Postoperative at 3 Month	Postoperative at 6 Month
Low risk	186 (62 %)	201 (67 %)	256 (85 %)	214 (71 %)
Medium risk	60 (20 %)	58 (19 %)	32 (14 %)	22 (7 %)
High risk	54 (18 %)	41 (14 %)	12 (4 %)	3 (1 %)
Lost to follow up	0 (%)	0 (%)	0 (%)	61 (20 %)
Total	300 (100 %)	300 (100 %)	300 (100 %)	300 (100 %)

Table 4: MUST Score Preoperatively, at 1 Month, 3 Months and 6 Months in the Study Population

As seen in the above table, preoperatively, low risk MUST score was observed in 62 %, medium risk in 20 % and high risk in 18 % while postoperatively, low risk MUST score was observed in 85 %, medium risk in 14 % and high risk in 4 % and the difference was statistically significant at 3 months.

DISCUSSION

In the present study, low risk (62 %) was the most common MUST score of study population followed by medium risk (20 %) and high risk (18 %). Teotia and Teotia Reviewed 1300 Indian patients with protein-energy deficiency and considered osteoporosis in their skeletal radiographs to be a clear finding. Calories, proteins and minerals, apart from calcium and vitamin D, play an important role in maintaining a healthy bone mass.⁵ In the present study, preoperatively, low risk MUST score was observed in 62 %, medium risk in 20 % and high risk in 18 % while postoperatively, low risk MUST score was observed in 85 %, medium risk in 14 % and high risk in 4 % and the difference was statistically significant.

Adding a daily protein supplement can improve the recovery of fractures and promote bone healing, reduce complications in the hospital, and decrease mortality risk in patients with hip fracture.⁶ Nonetheless, only offering protein as a supplement, as indicated in the recent Cochrane review, does not seem effective and dietary therapy may not be sufficiently convincing to alter dietary intake.^{7,8}

Recent studies show progress in dietary intake and subsequent health outcome changes.⁹⁻¹¹ Presence of systemic disorders like hypertension,¹²⁻¹⁴ diabetes¹⁵⁻¹⁶ also play a key role in fracture healing and treatment of these underlying entities needs to be addressed properly. Few of the related studies on bone and joint disorders are available.¹⁷⁻²⁰ A number of articles from Global Burden of Disease Study reflect on the evidence of traumatic fractures in geriatric populations globally^{21,22,23}. In future protein supplementation should be given and checked whether maximum benefits are obtained during post-surgery and rehabilitation.

Summary

The most common mode of trauma was fall from height (62 %) followed by Road Traffic Accidents (38 %). Closed reduction was the most common mode of treatment in 89 % followed by 11 open reductions. Fair functional outcome (35 %) was the most common functional outcome followed by excellent (29

%) and good (23 %). Low risk (62 %) was the most common MUST score followed by medium risk (20 %) and high risk (18 %). There was significant improvement in mean haemoglobin and BMI levels postoperatively as compared to preoperative values. Preoperatively, low risk MUST score was observed in 62 %, medium risk in 20 % and high risk in 18 % while postoperatively, low risk MUST score was observed in 85 %, medium risk in 14 % and high risk in 4 % and the difference was statistically significant.

Female patients of age between 50 - 60 years with history of slip and fall with femur fracture with low risk of MUST score had significant improvement in mean haemoglobin level and BMI level after 6 months.

CONCLUSIONS

Prevention of malnutrition could be related to a decrease in fracture incidence and a better functional recovery after fracture. Old age patients are at risk due to a higher prevalence of malnourishment. Health authorities are asked to check the dietetic component in this population and initiate nutrition supplementations.

Limitations

Few patients were lost to follow up.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

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