

Pre Operative Nutritional Status in Total Joint Arthroplasty and Its Short Term Outcomes

Dr Gautam Mazumder¹, Dr Patil Rakesh²

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I. Introductions

The role of nutrition and diet in orthopaedics was first reported by Cuthbertson in 1936. Few studies have tried to assess the importance of nutrition in joint replacement surgery. The prevalence of malnutrition in surgical patients has been reported to be as high as 50%. The rate of Total Joint Arthroplasty (TJA) for fractures and degenerative diseases of the various joints will increase substantially as the proportion of the elderly rises¹.

Nutrition significantly affects the healing process. Malnutrition has shown to be an independent risk factor for multiple post surgical complications following TJA in addition to increasing post operative complications. Not only does it increase the post operative morbidity, it also causes a huge economic burden on the healthcare. Complications such as infections or re-fractures can be devastating and become a financial burden to individual patients and society^{2,3}. Patient's age and co-morbidities play an important role in the prognosis⁴⁻⁶. A high proportion of elderly patients are malnourished on admission to hospital^{3,7,8}.

Poor nutrition is associated with muscle wasting, reduced power, immune compromised state, apathy and impaired cardiac function⁹. All these increase the likelihood of postoperative complications, prolonged recovery, and increased mortality¹⁰⁻¹³.

II. Aims And Objectives

1. To assess the preoperative nutritional status of the patients undergoing elective primary Total Joint Arthroplasty and its effect on post operative recovery.
2. To evaluate the relationship between the pre operative nutritional status and the post operative complications.

ANTHROPOMETRIC AND BIOCHEMICAL MARKERS

Nutritional markers

The nutritional markers can be classified in to two groups

1. Anthropometric markers
2. Biochemical markers.

The anthropometric markers are the most widely used and non invasive method of assessing the nutritional status¹⁴. The anthropometric markers commonly used are

Body Mass Index (BMI) and Triceps Skin Fold thickness (TSF).

BMI is calculated by the following formula –

$$\text{BMI} = \frac{\text{Weight in kilogram}}{(\text{Height in metre})^2}$$

A value less than 19.99 is considered as undernourished.

20 to 24.99 is considered as adequately nourished

25 to 29.99 is considered as over weight

30 to 39.99 is considered as obese

≥ 40 is considered as morbidly obese

BMI is the most accurate form of anthropometric measurement for assessing nutrition⁴⁶.

The biochemical markers commonly used for nutritional assessment are total lymphocyte count (TLC), albumin and transferrin

(TF)⁴⁶. Among these pre albumin and transferrin are found to be more accurate in assessing the nutritional status than the others.

Normal range for the biochemical markers are –

TLC- 1000 to 3500 / dl

Albumin - 3.4 to 5.4 g/dl
TF – 200 to 400 mg/dl

III. Materials And Methods

This was a prospective descriptive study done to determine the effect of pre operative nutritional on TJA. The patients included all those undergoing primary, elective and unilateral TJA.

ANALYSIS AND COMPARISON OF RESULTS

A total 38 patients underwent THR in the study period. 26 (68%) were males while rest 12 were females (32%). Considering the indications, AVN was the most common indication with 17 patients diagnosed with AVN(45%), followed by OA 10(27%), Fracture Neck Femur 7(19%), Ankylosing Spondylitis 3(7%) and 1 patient had Metastasis in the femoral head. The average of the BMI of the patients operated with THR was about 22.2, with 2(6%) patients having significantly lower BMI levels (18.4 and 18.8). No patients had increased triceps skin fold thickness.

15 patients (39%) were found to be anaemic. In the biochemical markers 4 patients (10%) had serum albumin level of <3.5 g/dl and 4 patients(10%) had a low lymphocytes counts. About 6 patients (15%) were diabetic but the glycemic status was well controlled before the surgery.

The average length of stay post operatively was 6.4 days, while 32 patients (84%) received 1 unit of whole blood post op and 6 received 2 units post op.

Two patients who underwent THR developed Surgical site infection within a week of the surgery.

One patient had only superficial infection. While the second patient had deep joint prosthesis infection

11 patients in the study underwent TKR. 6 were females and 5 were males. All the patients had OA of the knee involved which was the primary reason for the surgery. The avg age for these patients was about 61 years, which was higher than the avg age of patients who underwent THR. Out of the 11 patients 1 patient (9%) was found to be overweight (BMI- 26.1), while 4 patients (36%) had a raised thickness of triceps skin fold. Serum albumin was found to be low in 2 patients (18%) and 4 patients (36%) were found to be diabetic.

The avg BMI for patients undergoing TKR was 23.1, which was higher than the THR group. 5 patients (45%) were anaemic, which was significantly higher than the other groups. 7 patients post operatively got 1 unit of Whole blood transfusion and 4 patients (36%) received 2 units. This shows more number of patients required 2 units of BT post op w.r.t the THR group.

The avg length of stay post operatively was about 7.2 days which was higher than the THR group.

No patient developed post operative complications of any sort, including the systemic unexpected complications.

IV. Results

When BMI was analysed only 3 out of 50 patients had an abnormal BMI (p=0.126), which was found to be insignificant statistically.

While skin fold thickness (triceps) using the standard calliper, only 4 patients(8%) had an increased skin fold thickness. Both were found to be statistically insignificant in our study.

Coming to the biochemical markers, serum albumin was below the normal cut off for 6 patients. (p= 0.441) and the abnormal lymphocyte count was found in 4 out of the 50 patients. (p=0.095).

Anemia was found in 21 patients (p= 0.004) out of the 50 patients studied, which was statistically significant. 11 of them were males while 8 were females. Post operatively it was found that the patients with anemia had more chances of having a post op blood transfusion compared to the patients with normal haemoglobin.

In the post operative period, 2 of our patients developed wound related complications (4%). Both the patients had been operated for THR.



Image 1- Post operative Infected Wound

The average length of stay in patients undergoing THR in our study was found to be 6.4 days, while the average length of stay post TKR was 7.2 days, which was longer than THR owing to increased time needed to gain significant movements at the operated joints.

We compared the avg length of stay with the length of stay in patients with abnormal anthropometric and biochemical markers.

In patients with abnormal BMI the avg length of stay in THR was 7.2 days while in TKR it was about 10 days ($p < 0.001$) which was found to be significant.

While the avg length of stay in patients with low albumin levels for THR and TKR group was found to be 10.1 and 8 days respectively ($p = 0.441$).

The same for patients with anemia was 7 days for THR and 7.2 days for TKR ($p = 0.541$).

While in the patients who were diabetic the increase in the avg length of stay in both the groups i.e THR and TKR was found to be increased significantly ($p = 0.04$).

When we compared overall avg length of stay with length of stay in a patient with any one or more abnormal markers, we found that the increase in the length of stay was significant ($p < 0.001$). We could not establish a significant relationship between the abnormal markers – anthropometric as well as biochemical and the post operative complications both local and systemic.

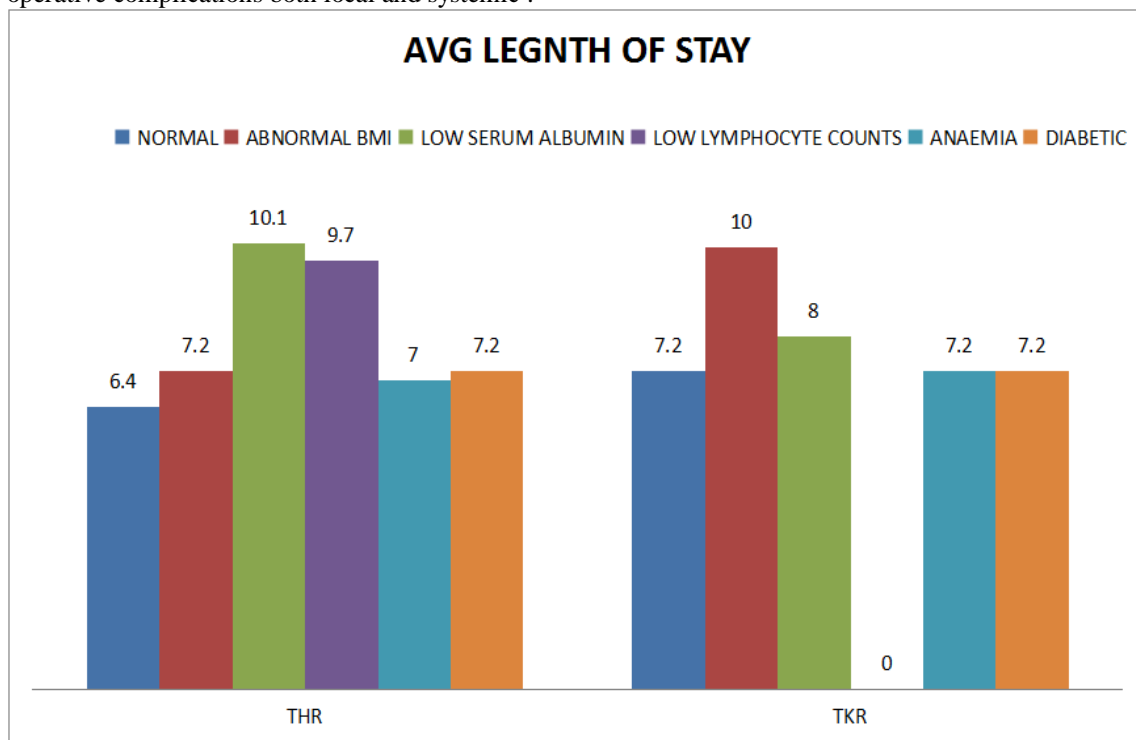


Fig 1- average length of post operative stay

V. Conclusion

This was a prospective study done to study the effect of pre operative nutritional status in TJA and its effect on post operative outcomes.

We were able to draw following important conclusions

1. THR was more prevalent in the study group than any other Arthroplasty.
2. Avascular necrosis was the most common indication for THR, while OA was almost the exclusive indication for TKR.
3. Albumin was a good indicator to measure pre operative nutritional status.
4. BMI was found to be high in patients undergoing TKR compared to other arthroplasty.
5. Anemia was significantly common among patients undergoing TJA.
6. Anemia increases the need for Blood transfusion post operatively.
7. Any abnormal nutritional marker, either Anthropometric or Biochemical increases the length of stay post operatively.
8. Abnormal BMI and pre operative Diabetes significantly increases the average length of post operative stay.
9. No statistical relationship was established between pre operative nutritional markers and complications occurring post operatively.

LIMITATIONS OF THE STUDY

1. Small sample size – Since the incidence of malnutrition in our study was only 4% compared to 40% in the literature, a bigger sample size would have given a better and clearer picture
2. Patient selection – We did not include trauma and tumour patients in our study . These patient groups are more vulnerable to nutritional depletion and a similar study on those patient groups would be valuable.
3. The indication for the surgery and the surgical techniques used for the surgery were not included in the analysis when comparing various outcomes.

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