

Original Research Article

Impact of malnutrition on postoperative outcomes in total knee arthroplasty: a comprehensive analysis

Maqbal Muhasin Nazar I. M., Jojo Inassi, Balaji Zacharia, Sharafuddeen Mammu*,
Nidhin Chacko V. H., Athish K. C.

Department of Orthopaedics, Government Medical College, Kozhikode, Kerala, India

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*Correspondence:

Dr. Sharafuddeen Mammu,

E-mail: sharafuddeen786@gmail.com

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ABSTRACT

Introduction: Malnutrition has been shown to cause perioperative complications, which can be particularly detrimental following total knee arthroplasty (TKA). These complications can lead to increased morbidity, extended hospital stays, and significant financial burdens on both patients and healthcare systems. To evaluate the nutritional status and body mass index (BMI) of patients undergoing TKA and monitor them for complications immediately postoperatively, at one week, and three months after surgery.

Methods: This prospective study included 88 patients who underwent TKA at government medical college Kozhikode, Kerala, India. Nutritional status was assessed using serum albumin, ferritin, haemoglobin, and BMI (body mass index) levels. Patients were followed up for three months postoperatively to identify any complications. Data analysis was conducted to determine the relationship between malnutrition and postoperative complications.

Results: Of the 88 patients, 5 developed major wound complications, with 4 of these patients exhibiting hypoalbuminemia. Hypoalbuminemia was found to have a statistically significant association with major wound complications ($p < 0.001$). Malnutrition was associated with higher rates of major wound complications, increased need for postoperative blood transfusions, and longer hospital stays.

Conclusion: Identifying modifiable risk factors such as malnutrition in patients undergoing TKA is crucial for reducing the risk of postoperative complications, which can otherwise lead to disastrous outcomes. Preoperative optimization of nutritional status can significantly improve surgical outcomes and reduce complications.

Keywords: Total knee arthroplasty, Malnutrition, Infection, Hypoalbuminemia

INTRODUCTION

Osteoarthritis stands as one of the most prevalent conditions addressed by orthopedic surgeons. While early cases can often be managed non-operatively, advanced stages frequently necessitate total knee replacement (TKA), particularly in older patients. The frequency of TKA procedures has been steadily increasing, with projections estimating annual procedures in the United States alone to reach 1.26 million by 2030.¹ Total joint arthroplasty is hailed as one of the most effective medical interventions, offering substantial benefits to patients and society alike. However, the occurrence of postsurgical

complications poses significant challenges due to increased hospital costs, prolonged stays, elevated readmission rates, and the potential for additional surgeries, including the grave risk of deep infection. These complications not only burden the healthcare system but also pose considerable risks to patient well-being.

The escalating demand and costs associated with TKA underscore the imperative to identify preoperative risk factors that influence patient outcomes.² Various factors, including body mass index (BMI), anemia, uncontrolled diabetes, substance abuse, and malnutrition, have been scrutinized for their predictive value in postoperative

complications. Of particular concern, poor nutritional status has been consistently linked to adverse postoperative outcomes in orthopaedic surgery. Studies have highlighted high rates of subclinical malnutrition among orthopaedic surgery patients, emphasizing the need to understand how these modifiable risk factors impact surgical results.

Assessing nutritional status involves various techniques, including indirect measures such as triceps skinfold and arm muscle circumference, which monitor skeletal muscle mass and body fat. However, these methods may not detect sudden changes or marginal nutritional deficiencies effectively. Serum markers, such as albumin and prealbumin, offer more sensitive indicators due to their shorter half-lives and ability to detect acute nutritional changes. Body mass index (BMI), calculated from a person's height and weight, provides a standardized measure for classifying malnutrition.

Malnutrition has emerged as a critical preoperative risk factor contributing to increased morbidity and mortality following joint arthroplasty.^{3,4} Recognizing malnutrition clinically can be challenging, as it often manifests in severe cases or develops gradually. Serum markers provide a more immediate assessment, particularly important in populations like India, where malnutrition remains a prevalent issue. Despite widespread use, debate persists over the most effective serum markers for assessing malnutrition. Serum albumin, for instance, despite being a negative acute phase reactant, has shown consistent associations with heightened complications following joint arthroplasty.

The association between preoperative malnutrition and postoperative outcomes following total knee arthroplasty remains inadequately explored, especially in regions like the Indian subcontinent, where malnutrition rates are notably higher than in Caucasian populations. This study aims to investigate the correlation between early postoperative complications following TKA and malnutrition, providing critical insights into optimizing preoperative care and enhancing surgical outcomes in this demographic.

METHODS

Study place

This prospective longitudinal observational study was conducted at Government Medical College Kozhikode in Kerala, India.

Study duration

The study period was from January 2023 to August 2024, following approval from the institutional ethical committee. The study aimed to evaluate the nutritional status and body mass index (BMI) of patients undergoing

primary total knee arthroplasty (TKA) for primary osteoarthritis of the knee.

Inclusion criteria

Patients undergoing primary total knee arthroplasty for primary osteoarthritis of the knee during the study period. Unilateral primary total knee arthroplasty.

Exclusion criteria

Patients who are unwilling to participate in the study. Post-traumatic osteoarthritis. Bilateral simultaneous total knee arthroplasty. Post-high tibial osteotomy total knee arthroplasty. Revision total knee arthroplasty. Osteoarthritis secondary to rheumatoid arthritis.

Sample size

Sample size was calculated using the formula, $N = (Z\alpha + Z\beta)^2 pq \times 2D^2$

Where p is prevalence p=26 and D (maximum permissible error) is 26. Thus, sample size obtained was 88. A total of 88 eligible patients were enrolled in the study.

Data collection

Data collection involved retrieving demographic, laboratory, and perioperative information from electronic medical records. Prior to surgery, participants underwent assessment for basic demographics (name, age, sex), comorbidities, and anthropometric measurements including height, weight, and calculation of BMI. Laboratory parameters such as serum albumin, ferritin, and haemoglobin levels were also measured preoperatively.

Follow up

Follow-up assessments were conducted at three intervals: immediately postoperative, at 1 week, and at 3 months following surgery. These evaluations included outpatient department reviews and telephonic communications to monitor patients for symptoms indicative of surgical site infection, overall complications, and pain scores. All patients received a standardized perioperative antibiotic regimen.

Infection surveillance adhered to the CDC National nosocomial infection surveillance system criteria for identifying superficial incisional surgical site infections (SSI). Sterile wound swabs were collected for gram staining and routine culture, with additional cultures for anaerobes or fungi performed when clinically indicated. Deep specimens were obtained during debridement procedures for culture and sensitivity testing if infection was suspected or confirmed. Primary outcomes of interest included major wound complications such as superficial wound infection, deep wound infection, and wound

dehiscence. Secondary outcomes included postoperative blood transfusions and length of hospital stay.

Statistical analysis

Statistical analysis was conducted using appropriate methods to evaluate the association between malnutrition indicators (e.g., hypoalbuminemia) and postoperative complications, with statistical significance set at $p < 0.05$.

RESULTS

Out of the 88 patients, 69 (78.4%) were female and 19 (21.6%) were male. The mean age of patients in the study was 66.18 ± 6.81 years. The majority of patients fell within the age group of 61-70 years (50%), with 21.6% aged between 50 and 60 years, and 28.4% aged between 71 and 80 years. Eighteen patients (20.5%) were diabetic, all of whom maintained controlled glycemic levels both preoperatively and postoperatively. Additionally, 5 patients (5.7%) had coronary artery disease, with 2 of them receiving low-dose aspirin therapy.

None of the 88 patients had chronic kidney disease, chronic liver disease, or chronic obstructive pulmonary disease. The mean hemoglobin level was 12.15 ± 0.98 g/dl. In this study, malnutrition was defined as a hemoglobin level below 11 g/dl. Accordingly, 10.2% (9) of the cases were classified as malnourished. For an albumin cutoff value of 3.5 g/dl to define malnutrition, 8% (7) of the cases in this study were classified as malnourished.⁷

The mean albumin value among the patients was 3.86 ± 0.32 g/dl. With a cutoff value of 15 micrograms/dl for defining low ferritin levels and hence malnutrition, 2.3% (2) of the cases in this study were classified as malnourished based on serum ferritin criteria. The mean

ferritin value among the patients was 86.02 ± 47.88 micrograms/dl. The mean BMI of the patients was 25.48 ± 2.64 . In this study, malnutrition concerning BMI was defined as any value below 18.5 or above 23. Accordingly, 81.8% (72) of the patients were classified as malnourished by these criteria. Specifically, 19.3% had a normal BMI, another 19.3% were overweight, and 61.4% were classified as obese (BMI > 25).

In the study, malnutrition was prevalent, with 81.8% (72 patients) meeting criteria due to abnormal values in hemoglobin, albumin, ferritin, or BMI. Wound infections were observed in a small proportion of patients: 2.3% developed superficial infections, while 1.1% experienced deep infections necessitating intravenous antibiotics, with one case requiring surgical debridement. Wound dehiscence occurred in 3.4% of patients, all of which healed with routine wound care without surgical intervention. Major wound complications, including infections and dehiscence, affected 5.7% (5 patients). Notably, no instances of wound hematoma were reported.

At the 3-month follow-up, patients reported an average pain score of 1.90 ± 0.69 , indicating relatively low levels of postoperative discomfort. The average duration of hospital stay was 4.43 ± 0.79 days. Serum albumin levels were found to be significantly associated with major wound complications.

Patients experiencing these complications had a mean serum albumin level of 3.33 ± 0.16 g/dl, notably lower than the 3.89 ± 0.30 g/dl observed in those without complications ($p < 0.001$). Among patients with major wound complications, 57% (4 out of 5) had hypoalbuminemia ($p = 0.001$), compared to 3.6% (3 out of 83) in the group without such complications.

Table 1: Factors associated with major wound complications.

Variable	Major wound complication		P value
	Present (n=5)	Absent (n=83)	
Haemoglobin			
Mean±SD	11.56±1.34	12.19±0.96	0.165
Albumin			
Mean±SD	3.34±0.16	3.89±0.30	<0.001*
Ferritin			
Mean±SD	74.20±61.02	86.73±47.35	0.573
BMI			
Mean±SD	27.52±4.29	25.36±2.49	0.076
Malnutrition according to hemoglobin–no (%)			
Present	2 (22.2)	7 (77.8)	0.080
Absent	3 (3.8)	76 (96.2)	
Malnutrition according to albumin–no (%)			
Present	4 (57.1)	3 (42.9)	<0.001*
Absent	1 (1.2)	80 (98.8)	
Malnutrition according to ferritin–no (%)			
Present	1 (50)	1 (50)	0.111
Absent	4 (4.7)	82 (95.3)	

Continued.

Variable	Major wound complication		P value
	Present (n=5)	Absent (n=83)	
Malnutrition according to BMI–no (%)			
Present	4 (5.6)	68 (94.4)	1.000
Absent	1 (6.2)	15 (93.8)	
Malnutrition according to either hemoglobin or albumin or BMI or ferritin-no (%)			
Present	4 (5.4)	70 (94.6)	1.000
Absent	1 (7.1)	13 (92.9)	
BMI – no (%)			
Normal	1 (5.9)	16 (94.1)	0.515
Overweight	0	17 (100)	
Obesity	4 (7.4)	50 (92.6)	

*Statistically significant.

Table 2: Factors associated with superficial wound infection.

Variable	Superficial wound infection		P value
	Present (n=2)	Absent (n=86)	
Hemoglobin			
Mean±SD	10.30±0.14	12.20±0.95	0.006*
Albumin			
Mean±SD	3.30±0.14	3.87±0.31	0.013*
Ferritin			
Mean±SD	40±24.04	87.09±47.84	0.171
BMI			
Mean±SD	27.80±2.26	25.43±2.63	0.212
Malnutrition according to hemoglobin–no (%)			
Present	2 (22.2)	7 (77.8)	0.009*
Absent	0	79 (100)	
Malnutrition according to albumin–no (%)			
Present	2 (28.6)	5 (71.4)	0.005*
Absent	0	81(100)	
Malnutrition according to ferritin–no (%)			
Present	0	2 (100)	1.000
Absent	2 (2.3)	84 (97.7)	
Malnutrition according to BMI-no (%)			
Present	2 (2.8)	70 (97.2)	1.000
Absent	0	16 (100)	
Malnutrition according to either hemoglobin or albumin or BMI or ferritin-no (%)			
Present	2 (2.7)	72 (97.3)	1.000
Absent	0	14 (100)	
BMI–no (%)			
Normal	0	17 (100)	0.525
Overweight	0	17 (100)	
Obesity	2 (3.7)	52 (96.3)	

*Statistically significant.

Table 3: Factors associated with deep wound infection.

Variable	Deep wound infection		P value
	Present (n=1)	Absent (n=87)	
No	1 (1.2)	82 (98.8)	
Hemoglobin			
Mean±SD	11.30	12.16±0.99	0.386
Albumi			
Mean±SD	3.20	3.87±0.32	0.040*

Continued.

Variable	Deep wound infection		P value
	Present (n=1)	Absent (n=87)	
Ferriti			
Mean±SD	132	85.49±47.90	0.337
BMI			
Mean±SD	30.20	25.43±2.60	0.072
Malnutrition according to hemoglobin-no (%)			
Present	0	9 (100)	1.000
Absent	1 (1.3)	78 (98.7)	
Malnutrition according to albumin-no (%)			
Present	1 (14.3)	6 (85.7)	0.080
Absent	0	81 (100)	
Malnutrition according to ferritin-no (%)			
Present	0	2 (100)	1.000
Absent	1 (1.2)	85 (98.8)	
Malnutrition according to BMI-no (%)			
Present	1 (1.4)	71 (98.6)	1.000
Absent	0	16 (100)	
Malnutrition according to either hemoglobin or albumin or BMI or ferritin-no (%)			
Present	1 (1.4)	73 (98.6)	1.000
Absent	0	14 (100)	
BMI-no (%)			
Normal	0	17 (100)	0.727
Overweight	0	17 (100)	
Obesity	1 (1.9)	53 (98.1)	

*Statistically significant.

Table 4: Factors associated with wound dehiscence.

Variable	Wound dehiscence		P value
	Present (n=3)	Absent (n=85)	
Hemoglobin			
Mean±SD	12.10±1.49	12.16±0.97	0.918
Albumin			
Mean±SD	3.43±0.15	3.87±0.32	0.019*
Ferritin			
Mean±SD	60.66±73.17	86.91±47.16	0.354
BMI			
Mean±SD	27.06±5.67	25.43±2.52	0.294
Malnutrition according to hemoglobin-no (%)			
Present	1 (11.1)	8 (88.9)	0.279
Absent	2 (2.5)	77 (97.5)	
Malnutrition according to albumin-no (%)			
Present	2 (28.6)	5 (71.4)	0.016*
Absent	1 (1.2)	80 (98.8)	
Malnutrition according to ferritin-no (%)			
Present	1 (50)	1 (50)	0.067
Absent	2 (2.3)	84 (97.7)	
Malnutrition according to BMI-no (%)			
Present	2 (2.8)	70 (97.2)	0.457
Absent	1 (6.3)	15 (93.8)	
Malnutrition according to either hemoglobin or albumin or BMI or ferritin-no (%)			
Present	2 (2.7)	72 (97.3)	0.409
Absent	1 (7.1)	13 (92.9)	
BMI-no (%)			
Normal	1 (5.9)	16 (94.1)	0.628
Overweight	0	17 (100)	
Obesity	2 (3.7)	52 (96.3)	

*Statistically significant.

Table 5: Factors associated with postoperative blood transfusion.

Variable	Postoperative blood transfusion	
	Mean±SD	P value
Malnutrition according to hemoglobin–no (%)		
Present	0.33±0.50	<0.001*
Absent	0.01±0.11	
Malnutrition according to albumin–no (%)		
Present	0.29±0.48	0.001*
Absent	0.02±0.15	
Malnutrition according to ferritin–no (%)		
Present	0.50±0.70	0.002*
Absent	0.03±0.18	
Malnutrition according to BMI–no (%)		
Present	0.06±0.23	0.340
Absent	0±0	
Malnutrition according to either hemoglobin or albumin or BMI or ferritin–no (%)		
Present	0.05±0.22	0.379
Absent	0±0	
BMI – no (%)		
Normal	0±0	0.274
Overweight		
Obesity		

*Statistically significant.

In the study, major wound complications encompassed superficial and deep wound infections, as well as wound dehiscence. Anemia and hypoalbuminemia were found to be associated with an increased risk of superficial wound infections. Specifically, patients who developed superficial wound infections exhibited lower mean hemoglobin levels of 10.30±0.14 g/dl and mean albumin levels of 3.30±0.14 g/dl compared to those without such infections, who had higher mean hemoglobin levels of 12.20±0.95 g/dl and mean albumin levels of 3.87±0.31 g/dl ($p=0.006$). These findings underscore the significance of maintaining adequate hemoglobin and albumin levels to potentially mitigate the risk of superficial wound infections following total knee arthroplasty.

Those who developed superficial wound infections exhibited significantly lower hemoglobin levels (10.30±0.14 vs 12.20±0.95 g/dl) and albumin levels (3.30±0.14 vs 3.87±0.31 g/dl) compared to those who did not. These findings underscore the association between lower hemoglobin and albumin levels and an increased likelihood of developing superficial wound infections following total knee arthroplasty.

Hypoalbuminemia is also associated with deep wound infection and wound dehiscence. Patients who developed deep wound infections had a mean albumin value of 3.20, whereas those without deep wound infections had a higher mean albumin value of 3.87±0.32 ($p<0.019$). Similarly, patients with wound dehiscence had a mean albumin value of 3.43±0.15, whereas those without dehiscence had a mean albumin value of 3.87±0.32 ($p=0.019$). These results highlight the significant association between lower albumin levels and an increased risk of both deep wound

infections and wound dehiscence following total knee arthroplasty. Regarding, postoperative blood transfusion, significant associations were observed with low haemoglobin, hypoalbuminemia, and low ferritin values. Patients with these conditions required postoperative blood transfusion at mean rates of 0.33±0.50 units (low haemoglobin), 0.29±0.48 units (hypoalbuminemia), and 0.50±0.70 units (low ferritin), respectively. In comparison, those without these forms of malnutrition received significantly fewer transfusions, with mean rates of 0.01±0.11 units (low haemoglobin), 0.03±0.18 units (hypoalbuminemia), and 0.02±0.15 units (low ferritin), respectively ($p<0.001$, $p=0.001$, and $p=0.002$). These findings underscore the importance of maintaining adequate haemoglobin, albumin, and ferritin levels to potentially reduce the need for postoperative blood transfusions following total knee arthroplasty.

DISCUSSION

Malnutrition remains a significant issue among patients undergoing total knee replacement, as evidenced by our study, which identified 10.2% of patients with hypoalbuminemia. Our findings also revealed a higher incidence of postoperative wound complications in malnourished patients. Specifically, patients with preoperative albumin levels below normal range were more likely to experience postoperative wound problems and require blood transfusion following total knee arthroplasty (TKA). Lower-than-cutoff levels of ferritin and hemoglobin were also associated with increased complication rates. It is important to acknowledge that not all TKAs are elective procedures, particularly in cases where severe pain and deformity necessitate prompt

intervention, limiting opportunities for patient optimization preoperatively. In our study, malnutrition was defined as having abnormal values in hemoglobin, albumin, ferritin, or BMI. The prevalence of malnutrition based on these criteria was 10.2%, 8%, 2.3%, and 81.8%, respectively. When considering malnutrition defined by any of these criteria, the prevalence rose to 84.1%. This figure is notably higher compared to previous studies that did not include BMI as a criterion for malnutrition. In our cohort, 19.3% were overweight and 61.4% were obese, contributing to the higher prevalence of malnutrition. Excluding BMI from the criteria reduced the prevalence to levels comparable to studies by Greene et al, (27%), Rudasill et al, (4.15%), and Fu et al, (6.1%).⁵⁻⁷

These findings underscore the complex interplay of nutritional factors in TKA outcomes and highlight the need for comprehensive preoperative assessment and management to optimize patient outcomes. In our study, the incidence of superficial and deep wound infections was 2.3% and 1.1%, respectively, contributing to an overall 5.7% incidence of wound complications. While these percentages may seem relatively small, the impact of wound complications following knee replacement surgery can be severe for both patients and surgeons alike.

Comparatively, Greene et al, reported a higher incidence of major wound complications at 7%, with superficial surgical site infections accounting for the majority (3.7%) compared to deep infections (1.8%). Among the four parameters used to define malnutrition in our study, only hypoalbuminemia demonstrated a statistically significant association with major wound complications and wound dehiscence. Patients with major wound complications had a mean albumin level of 3.34 ± 0.16 g/dl, whereas those without major complications had a higher mean albumin level of 3.89 ± 0.30 g/dl ($p < 0.001$). Both low hemoglobin and hypoalbuminemia were also significantly associated with superficial wound infections.

Interestingly, 57% of patients classified as malnourished due to hypoalbuminemia developed major wound complications, in contrast to only 1.2% of those with normal albumin levels. This underscores a higher incidence of major wound complications in patients with hypoalbuminemia, albeit influenced by the study's sample size. Similar associations between hypoalbuminemia and postoperative infections and wound complications have been noted in previous studies by Roche et al, and Kamath et al.⁹ These findings emphasize the critical role of preoperative nutritional assessment and management in optimizing outcomes following total knee arthroplasty.

In our study, the critical impact of serum albumin levels on wound healing and complications post-total knee arthroplasty (TKA) was underscored. Serum albumin levels below 2.0 g/dl exacerbate protein catabolism, impeding wound healing and increasing the risk of wound dehiscence.¹⁰⁻¹² Levels below 3.0 g/dl leads to tissue edema, reducing oxygen availability and hindering wound

healing by impairing angiogenesis and fibroblast activity, which are crucial for collagen production and remodeling.^{10,12} Our findings also highlighted a significant association between superficial wound infections and low hemoglobin levels. This relationship has been well-established in previous studies globally, such as those by Lieu et al and Shaw et al, which have explored the complex connection between anemia and susceptibility to surgical site infections.^{13,14} Low iron levels associated with anemia can compromise immune function, making individuals more susceptible to infections.^{14,15}

Furthermore, our study identified low hemoglobin, hypoalbuminemia, and low ferritin levels as predictors of increased postoperative blood transfusion requirements. Hypoalbuminemia's association with intraoperative and postoperative blood transfusions has been previously documented in studies by Kamath et al and Fu et al.^{7,9} Similarly, preoperative anemia has been linked to higher rates of postoperative transfusions in surgical patients in another research.¹⁶ Female gender, low hemoglobin levels, and hypoalbuminemia were also correlated with extended hospital stays in our study cohort. Patients with postoperative anemia required blood transfusions, prolonging their hospitalization until their hemoglobin levels normalized. This aligns with findings from studies by Kamath et al and Fu et al, where hypoalbuminemia was similarly associated with longer hospital stays.^{7,9}

While we found a statistically significant difference in albumin levels between patients with and without deep wound infections, malnutrition defined solely by hypoalbuminemia did not show a significant association with deep wound infections in our study. Interestingly, we observed negative correlation coefficients (-0.312 and 0.278) between hemoglobin and serum albumin levels and the need for postoperative blood transfusions, indicating that lower levels of these parameters correlated with increased transfusion requirements. Conversely, higher BMI was positively correlated with the need for postoperative blood transfusions, as indicated by correlation coefficients of 0.318 and 0.568, respectively.

These findings highlight the multifaceted role of nutritional and hematologic parameters in influencing postoperative outcomes following TKA, emphasizing the importance of preoperative optimization to mitigate complications and improve patient recovery.

There are some limitations of the study these are as follows.

Single-center study

The study was conducted at a single institution, Government Medical College Kozhikode, Kerala, India. This may limit the generalizability of the findings to other geographic regions or healthcare settings with different patient demographics or medical practices.

Sample size

Although the study included 88 patients, the sample size may still be relatively small to fully capture the diversity of postoperative outcomes and complications. A larger sample size could provide more robust data and enhance the statistical power of the study.

Nutritional assessment methods

Nutritional status was assessed using serum albumin, ferritin, hemoglobin, and BMI. While these indicators are useful, they may not fully encompass the complexities of malnutrition. More comprehensive assessments, such as detailed dietary evaluations or functional assessments, could provide additional insights.

CONCLUSION

Our findings clearly demonstrate that malnourished patients are at higher risk of experiencing postoperative wound complications and requiring interventions such as blood transfusions during and after surgery. Lower preoperative levels of albumin, ferritin, and hemoglobin were associated with increased susceptibility to these complications, emphasizing the importance of optimizing these parameters prior to surgery to mitigate risks. It is crucial to recognize the complexity of managing malnutrition in surgical settings, especially in cases where TKA may not be elective due to severe pain and deformity. In such situations, postponing elective procedures when feasible could potentially improve patient outcomes by allowing for better preoperative optimization.

In conclusion, proactive assessment and optimization of nutritional and hematologic parameters before TKA are essential strategies to minimize the incidence of postoperative complications. By addressing malnutrition early in the care pathway, healthcare providers can enhance surgical outcomes, reduce complications, and improve overall recovery for patients undergoing total knee arthroplasty. Future research should continue to explore targeted interventions to further refine preoperative optimization protocols and improve patient care in orthopaedic surgery.

Clinical significance

The clinical significance of our study lies in its findings regarding the prevalence of malnutrition and its impact on outcomes following total knee arthroplasty (TKA). Here are the key clinical implications derived from our research.

Prevalence of malnutrition

We identified a significant proportion of patients (10.2%) with hypoalbuminemia, indicating that malnutrition remains common among individuals undergoing TKA. This underscores the importance of routine preoperative

nutritional assessment to identify and address malnutrition early.

Increased risk of wound complications

Malnourished patients in our study demonstrated higher rates of postoperative wound complications, including superficial and deep infections. This association highlights the critical role of nutritional optimization in reducing the incidence of these complications.

Impact on blood transfusion requirements

Patients with preoperative hypoalbuminemia, low haemoglobin, and low ferritin levels were more likely to require postoperative blood transfusions. Addressing these parameters preoperatively may help minimize the need for transfusions and improve patient outcomes.

Clinical decision making

Our findings suggest that optimizing nutritional and hematologic status before TKA could potentially reduce the risk of complications and improve surgical outcomes. This information is vital for clinical decision-making, guiding healthcare providers in prioritizing preoperative interventions to enhance patient safety and recovery.

Patient management strategies

Implementing preoperative nutrition therapies and targeted interventions based on identified risk factors can play a crucial role in mitigating postoperative complications. This approach not only improves patient outcomes but also optimizes healthcare resource utilization by reducing the incidence of prolonged hospital stays and additional interventions.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Schwartz AM, Wilson JM, Farley KX, Bradbury TL, Guild GN. Concomitant malnutrition and frailty are uncommon, but significant risk factors for mortality and complication following primary total knee arthroplasty. *J Arthroplasty*. 2020;35(10):2878-85.
2. Wolford ML, Palso K, Bercovitz A. Hospitalization for total hip replacement among inpatients aged 45 and over: United States, 2000–2010. *NCHS Data Brief*. 2015;(186):1-8.
3. Ellsworth B, Kamath AF. Malnutrition and total joint arthroplasty. *J Nat Sci*. 2016;2(3):179.
4. Cross MB, Yi PH, Thomas CF, Garcia J, Della Valle CJ. Evaluation of malnutrition in orthopaedic surgery. *J Am Acad Orthop Surg*. 2014;22(3):193-9.

5. Misra A, Chowbey P, Makkar BM. Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for Asian Indians and recommendations for physical activity, medical and surgical management. *J Assoc Physicians India*. 2009;57:163-70.
6. Rudasill S, Gittings DJ, Elkassabany NM, Liu J, Nelson CL, Kamath AF. Preoperative Risk Factor Score Predicts Malnutrition in Total Joint Arthroplasty Patients. *J Surg Orthop Adv*. 2019;28(2):97-103.
7. Fu MC, McLawhorn AS, Padgett DE, Cross MB. Hypoalbuminemia is a better predictor than obesity of complications after total knee arthroplasty: a propensity score-adjusted observational analysis. *HSSJ*. 2017;13(1):66-74.
8. Roche M, Law TY, Kurowicki J, Sodhi N, Rosas S, Elson L, Summers S, Sabeh K, Mont MA. Albumin, prealbumin, and transferrin may be predictive of wound complications following total knee arthroplasty. *J Knee Surg*. 2018;31(10):946-51.
9. Kamath AF, Nelson CL, Elkassabany N, Guo Z, Liu J. Low Albumin Is a Risk Factor for Complications after Revision Total Knee Arthroplasty. *J Knee Surg*. 2017;30(3):269-75.
10. Myers WT, Leong M, Phillips LG. Optimizing the patient for surgical treatment of the wound. *Clin Plast Surg*. 2007;34(04):607–20.
11. Ethridge RT, Leong M, Phillips LG. Wound healing. *Sabiston textbook of surgery: The biological basis of modern surgical practice*. 20th ed. Philadelphia: Elsevier. 2017:130-62.
12. Robson MC, Phillips LG, Lawrence WT. The safety and effect of topically applied recombinant basic fibroblast growth factor on the healing of chronic pressure sores. *Ann Surg*. 1992;216(04):401-6.
13. Liu L, Liu L, Liang LC, Zhu ZQ, Wan X, Dai HB et al. Impact of preoperative anemia on perioperative outcomes in patients undergoing elective colorectal surgery. *Gastroenterol Res Pract*. 2018;11:2417028.
14. Shaw JG. Iron deficiency anaemia: focus on infectious diseases in lesser developed countries. *Anemia*. 2011; 1:260380.
15. Viana MB. Anemia and infection: a complex relationship. *Rev Bras Hematol Hemoter*. 2011;33(2):90-2.
16. Bursi F, Barbieri A, Politi L, Di Girolamo A, Malagoli A, Grimaldi T, et al. Perioperative red blood cell transfusion and outcome in stable patients after elective major vascular surgery. *Eur J Vasc Endovasc Surg*. 2009;37(3):311-8.

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