

IMPACT OF PREOPERATIVE NUTRITIONAL STATUS ON SURGICAL OUTCOMES IN GASTRIC CANCER PATIENTS: A PROSPECTIVE OBSERVATIONAL STUDY

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Abstract

Background: Gastric cancer surgery often presents challenges, and the nutritional status of patients can play a pivotal role in their postoperative recovery. This prospective observational study aimed to investigate the influence of preoperative nutritional status on surgical outcomes in gastric cancer patients. **Material and Methods:** A total of 100 gastric cancer patients were divided into two groups: Group A (Well-Nourished) and Group B (Malnourished), based on their preoperative nutritional status. We assessed various parameters, including postoperative complications, length of hospital stay, 30-day mortality rate, readmission rates, quality of life post-surgery, nutritional recovery post-surgery, incidence of surgical site infections, and the need for postoperative interventions. **Results:** Group B (Malnourished) demonstrated significantly poorer surgical outcomes compared to Group A (Well-Nourished). Group B experienced a higher overall complication rate (40%) compared to Group A (10%). Complications in Group B included superficial wound infections (20%), anastomotic leaks (10%), delayed wound healing (15%), pneumonia (10%), and urinary tract infections (5%). Group B also had a longer average hospital stay (12 days) than Group A (7 days) and a higher 30-day mortality rate (15% vs. 2%). Furthermore, Group B exhibited higher readmission rates (25% vs. 5%) and reported lower quality of life scores post-surgery (4 vs. 8). Nutritional recovery was slower in Group B, with only 50% returning to pre-surgery status within 6 weeks, compared to 90% in Group A within 3 weeks. Additionally, Group B had a higher incidence of surgical site infections (20% vs. 5%) and a greater need for postoperative interventions (35% vs. 8%). **Conclusion:** Preoperative malnutrition significantly impacts surgical outcomes in gastric cancer patients. Optimizing nutritional status before surgery is imperative to reduce complications, enhance recovery, and improve overall patient well-being. These findings underscore the importance of comprehensive nutritional assessment and intervention as an integral part of the management of gastric cancer patients undergoing surgery.

INTRODUCTION

The surgical management of gastric cancer is a complex and challenging endeavor. It requires not only meticulous surgical technique but also a comprehensive understanding of the patient's overall health, particularly their nutritional status.^[1,2] Gastric

cancer, a leading cause of cancer-related mortality worldwide, is often diagnosed at advanced stages, necessitating aggressive surgical interventions. However, the success of these interventions is not solely dependent on the surgical procedure itself but is intricately linked to the patient's preoperative condition, including their nutritional health. This connection between nutritional status and surgical

outcomes forms the basis of this prospective observational study.^[3,4]

Nutrition plays a critical role in the human body's ability to heal and recover from trauma, including surgical procedures.^[5] In the context of gastric cancer, where the disease and its treatment can significantly affect dietary intake and nutritional absorption, the impact of nutrition becomes even more pronounced. Patients with gastric cancer frequently experience weight loss, decreased appetite, and malabsorption of nutrients due to the tumor's effect on the stomach's functioning and the systemic effects of the cancer itself.^[6] Consequently, malnutrition or poor nutritional status is not uncommon in these patients and can be a significant predictor of postoperative outcomes.

Malnutrition in gastric cancer patients can lead to a host of postoperative complications. It impairs immune function, reduces the strength of the musculoskeletal system, and diminishes the body's capacity to heal wounds.^[7] This impaired physiological state can result in increased susceptibility to infections, delayed wound healing, and prolonged recovery periods. The importance of nutrition is thus paramount, not only in the overall management of cancer but specifically in the perioperative setting.

Recent literature has increasingly highlighted the impact of preoperative nutritional status on surgical outcomes in various cancers, including gastric cancer. However, there is a need for more focused, comprehensive research in this area to understand the full extent of this relationship. By identifying specific aspects of surgical outcomes that are most affected by nutritional status, healthcare professionals can tailor preoperative care to improve overall patient outcomes.

The aim of this study is to rigorously examine the impact of preoperative nutritional status on surgical outcomes in patients undergoing gastric cancer surgery. The specific objectives include categorizing patients into well-nourished and malnourished groups based on preoperative assessments, and comparing their postoperative outcomes in terms of complication rates, length of hospital stay, 30-day mortality rate, readmission rates, quality of life, and nutritional recovery post-surgery. Additionally, the study aims to assess the incidence of surgical site infections and the necessity for postoperative interventions in these groups. This comprehensive analysis is intended to highlight the significance of preoperative nutritional status in determining postoperative recovery and overall patient well-being, ultimately guiding improvements in the preoperative management of gastric cancer patients.

MATERIAL AND METHODS

Study Design

This research adopts a prospective observational design, which is pivotal in understanding the natural

progression of clinical outcomes. The prospective nature ensures that data is collected forward in time from the point of enrolment, offering a dynamic insight into the evolution of clinical outcomes post-surgery.

Setting

The study is situated at MNJ Cancer Hospital and Regional Research Centre, Hyderabad. This setting is significant as it is a specialized center for cancer treatment, ensuring an adequate and relevant patient population for this specific study. The demographic and clinical characteristics of patients at this center provide a unique and pertinent context for the research.

Study Period

Spanning from January 1st, 2023, to October 2023, this period was chosen to ensure a sufficient timeframe for enrolment, intervention, and follow-up, providing a robust data set for analysis.

Participants

Inclusion Criteria

Diagnosed with gastric cancer and scheduled for surgical treatment: This criterion ensures that the study focuses on a specific patient population with a uniform primary clinical condition.

Age 18 years and above: Adult patients are chosen to ensure decision-making capacity and consent validity.

Consent to participate: Ethical requirement ensuring voluntary participation.

Exclusion Criteria

Other active malignancies: To isolate the impact of gastric cancer and its treatment.

Palliative care: As the focus is on curative surgical intervention.

Severe comorbid conditions: To reduce confounding variables that can independently affect outcomes.

Sample Size

The choice of 100 patients offers a balance between statistical power and feasibility, considering the availability of eligible patients within the study period.

Grouping of Participants

The division into well-nourished and malnourished groups is a crucial step. It is based on objective criteria like BMI, serum albumin levels, and weight loss percentage, ensuring an accurate and reliable categorization. Standardized nutritional assessment tools further add to the robustness of this classification.

Data Collection

Preoperative Assessment

Nutritional assessment: Involves comprehensive measurements to accurately determine the nutritional status, which is central to the study's hypothesis.

Surgical Data

Capturing detailed information on the surgery will allow for the examination of the interplay between surgical factors and nutritional status.

Postoperative Follow-up

A thorough follow-up mechanism is in place to capture a wide array of outcomes, providing a holistic view of the patient's postoperative journey.

Data Analysis

The statistical approach is chosen to suit the nature of the data, ensuring the validity and reliability of the results.

The use of sophisticated statistical software indicates a commitment to a high standard of data analysis.

Ethical Considerations

Institutional Ethics Committee approval and informed consent are fundamental to uphold the ethical integrity of the study. The emphasis on confidentiality respects participant privacy and aligns with ethical research practices.

RESULTS

Postoperative Complications

In this study, we investigated the postoperative complications experienced by gastric cancer patients categorized into two groups based on their nutritional status. Group A (Well-Nourished) exhibited an overall complication rate of 10%, with the most common complication being superficial wound infections at 5%. Transient ileus was also observed in 5% of Group A patients. Notably, Group B (Malnourished) experienced a significantly higher overall complication rate of 40%. The complications in Group B included superficial wound infections (20%), anastomotic leaks (10%), delayed wound healing (15%), pneumonia (10%), and urinary tract infections (5%). [Table 1]

Length of Hospital Stay

Our study also examined the length of hospital stays for both groups of patients. Group A (Well-Nourished) had an average length of stay of 7 days, with a range of 5 to 9 days. In contrast, Group B (Malnourished) had a notably longer average length of stay at 12 days, with a range of 8 to 16 days. This suggests that malnourished patients required more extended hospitalization, likely due to the management of postoperative complications. [Table 2]

Thirty-day Mortality Rate

The 30-day mortality rate was another critical aspect of our investigation. In Group A (Well-Nourished), the 30-day mortality rate was exceptionally low at 2%, indicating a

favorable post-surgery recovery. However, Group B (Malnourished) experienced a substantially higher 30-day mortality rate of 15%, underscoring the adverse impact of poor nutritional status on recovery and overall health [Table 3].

Readmission Rates

Our findings revealed differences in readmission rates within 30 days post-discharge between the two groups. Group A (Well-Nourished) had a readmission rate of 5%, indicating fewer postoperative complications requiring readmission. In contrast, Group B (Malnourished) exhibited a higher readmission rate of 25%, primarily attributed to complications stemming from poor nutritional status. [Table 4]

Quality of Life Post-Surgery

The study assessed the quality of life post-surgery using a 1-10 scale. Group A (Well-Nourished) reported a significantly higher average quality of life score of 8, suggesting a better overall recovery and well-being. Conversely, Group B (Malnourished) reported a lower average score of 4, often linked to prolonged recovery times and the presence of complications. [Table 5]

Nutritional Recovery Post-Surgery

Nutritional recovery post-surgery was a critical aspect of our investigation. Group A (Well-Nourished) demonstrated a robust nutritional recovery, with 90% of patients returning to their pre-surgery nutritional status within 3 weeks. In contrast, Group B (Malnourished) exhibited slower nutritional recovery, with only 50% of patients returning to their pre-surgery nutritional status, requiring an average of 6 weeks. [Table 6]

Incidence of Surgical Site Infections

The study also examined the incidence of surgical site infections. Group A (Well-Nourished) had a lower incidence of surgical site infections at 5%. In contrast, Group B (Malnourished) had a higher incidence of 20%, which correlated with their overall poor nutritional status. [Table 7]

Need for Postoperative Interventions

Finally, we assessed the need for postoperative interventions. Group A (Well-Nourished) was less likely to require additional interventions, with only 8% of patients needing further surgical procedures or intensive nutritional support. However, Group B (Malnourished) exhibited a higher need for postoperative interventions, with 35% of patients requiring additional surgical intervention and extended nutritional rehabilitation. [Table 8]

Table 1: Postoperative Complications

Group	Overall Complications (%)	Superficial Wound Infections (%)	Transient Ileus (%)	Anastomotic Leaks (%)	Delayed Wound Healing (%)	Pneumonia (%)	Urinary Tract Infections (%)
A (Well-Nourished)	10	5	5	-	-	-	-
B (Malnourished)	40	20	-	10	15	10	5

Table 2: Length of Hospital Stay

Group	Average Length of Stay (days)	Range of Stay (days)
A (Well-Nourished)	7	5-9
B (Malnourished)	12	8-16

Table 3: Thirty-day Mortality Rate

Group	30-day Mortality Rate (%)
A (Well-Nourished)	2
B (Malnourished)	15

Table 4: Readmission Rates

Group	Readmission Rate within 30 days post-discharge (%)
A (Well-Nourished)	5
B (Malnourished)	25

Table 5: Quality of Life Post-Surgery

Group	Average Quality of Life Score (1-10)
A (Well-Nourished)	8
B (Malnourished)	4

Table 6: Nutritional Recovery Post-Surgery

Group	Patients Returning to Pre-Surgery Nutritional Status (%)	Average Time to Recovery (weeks)
A (Well-Nourished)	90	3
B (Malnourished)	50	6

Table 7: Incidence of Surgical Site Infections

Group	Incidence of Surgical Site Infections (%)
A (Well-Nourished)	5
B (Malnourished)	20

Table 8: Need for Postoperative Interventions

Group	Need for Additional Interventions (%)
A (Well-Nourished)	8
B (Malnourished)	35

DISCUSSION

Higher Complication Rates in Malnourished Patients: The significant increase in overall complications in malnourished patients (Group B) compared to well-nourished patients (Group A) resonates with the findings of Kim et al.⁹ and Bian et al.^[13] who reported similar associations between malnutrition and increased postoperative complications. These studies collectively underscore the detrimental effects of malnutrition on immune function and wound healing.

Extended Hospitalization for Malnourished Patients: The longer average hospital stay for malnourished patients observed in our study aligns with the findings of Brown et al.^[15] and Matsui et al.^[14] further highlighting the significant healthcare resource implications of malnutrition. This suggests that proactive nutritional interventions preoperatively could potentially reduce hospital stays, enhancing patient throughput and reducing healthcare costs.

Increased Mortality in Malnourished Patients: The increased 30-day mortality rate in malnourished patients found in our study is echoed in the work of Gupta et al. and Nourissat et al.^[11] which also noted the severe impact of poor nutritional status on survival post-cancer surgery.

Higher Readmission Rates for Malnourished Patients: The increased readmission rates in Group B, as observed in our study, are in line with Morrison-Jones and West's,^[8] findings highlighting the ongoing health challenges faced by malnourished patients post-discharge.

Lower Quality of Life in Malnourished Patients: The marked difference in quality of life scores post-surgery between the two groups in our study reflects the findings of Sikder et al.^[12] illustrating the broader

impacts of malnutrition on not only physical recovery but also overall well-being.

Slower Nutritional Recovery for Malnourished Patients: The delayed return to pre-surgery nutritional status in malnourished patients is consistent with the broader narrative on the long-lasting effects of malnutrition before surgery, as discussed in the studies by Morrison-Jones and West and Brown et al.^[8]

Increased Surgical Site Infections in Malnourished Patients: Our finding of a higher incidence of surgical site infections in malnourished patients aligns with the observations by Bian et al.^[13] further highlighting the complications arising from impaired immune function due to malnutrition.

Greater Need for Additional Interventions in Malnourished Patients: The higher percentage of malnourished patients requiring postoperative interventions in our study is corroborated by findings from Matsui et al.^[14] indicating a higher burden of care in terms of resource allocation and patient morbidity.

Clinical Implications and Recommendations

These findings collectively emphasize the critical need for routine preoperative nutritional assessments and interventions for gastric cancer patients, as supported by Brown et al.^[15] and Morrison-Jones and West.^[8] A multidisciplinary approach involving dietitians and nutritionists, as recommended by Morrison-Jones and West, is crucial in improving nutritional status and overall outcomes for gastric cancer patients.

Limitations and Future Research

The study's single-center design may limit the generalizability of the findings. Future research should focus on multi-center studies to validate these results. Additionally, randomized controlled trials investigating specific nutritional interventions would

be valuable in establishing causality and determining the most effective strategies.

CONCLUSION

The study conclusively demonstrates that preoperative nutritional status significantly affects surgical outcomes in gastric cancer patients. Malnourished patients experienced higher complication rates, longer hospital stays, increased mortality, and slower recovery. These findings underscore the critical need for integrating nutritional assessments and interventions in preoperative care, highlighting nutrition's pivotal role in enhancing patient outcomes and advocating for a nutrition-focused approach in the management of gastric cancer surgery.

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