



EFFECT OF NUTRITIONAL STATUS ON THE POSTOPERATIVE OUTCOME OF PATIENTS UNDERGOING MAJOR ABDOMINAL SURGERY

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ABSTRACT

Background: Preoperative nutritional deficiency is an established cause of perioperative morbidity and mortality. We studied the effect of preoperative nutritional status on postoperative outcomes in patients undergoing abdominal surgery. **Methods:** 701 consecutive patients who underwent major gastrointestinal surgery from October 2022 to April 2024 were included excluding those with chronic liver or kidney disease, on immunosuppression and on artificial nutrition. Data on patient demographics, nutritional status/risk, post-operative nutritional management and clinical outcomes were collected. Markers of nutritional status and risk were assessed; Nutritional risk index (Buzby index) and Malnutrition status. Clinical outcomes included Postoperative complication, Length of hospital stay, Length of ICU stay, Mortality. Multivariate linear and logistic regression were used to test for associations with clinical outcomes. **Results:** There were 60% Male & 40% Female with a mean age of 48.5 years (Range 1-96) who had median (IQR) post-operative LOS was 9.0 days (2-84). The median length of ICU stay was 0(range 0-70 days). 18.4% of patients (n=130) developed grade III or more severe post-operative complication. Of all the intra operative variables examined in the study the nature of surgery, type of surgery, blood loss and the need for blood transfusion were statistically significant ($p < 0.05$) in predicting the severe post-operative complication. For complications, there was significant difference between mild ($P=0.4303$), moderate ($P=0.2478$) and severe ($P=0.0643$) Buzby group. The odds ratios for the association between malnutrition and the mortality increases with severity of malnutrition **Conclusion:** Abnormal Nutritional risk index in patients undergoing major gastrointestinal surgery predicts severe post-operative complications, prolonged ICU and hospital stays.

KEYWORDS : Preoperative Nutrition, Postoperative Complications, Major Abdominal Surgeries

INTRODUCTION

Preoperative nutritional deficiency is a long-time cause of perioperative morbidity and mortality. Nutritional deficiency disease in Gastrointestinal surgery is caused by decreased oral food intake, tumour-related debility, impaired biological process because of gut resections, however it can also be because of obstruction of the gastrointestinal tract, pre-existing chronic diseases, and socio-economic factors.

As we all know that outcome of surgery is multifactorial and it is interdependent, in that many are irreversible. But malnutrition is a reversible one and if tackle it nicely by identifying prior and intervene correctly outcomes can be made better. There are very less studies in Indian literature where so it is our attempt to study the outcomes based on nutritional status of patient.^(1,2)

While most of surgical risk factors related to increased perioperative morbidity and mortality can't be corrected, malnutrition is reversible through adequate nutritional support. Therefore, malnutrition is a beautiful target to scale back morbidity and costs in surgery. It's been proved that improvement of the patient's nutritional status and preoperative nutritional support considerably decrease postoperative complications.⁽²⁾

Malnourished patients often present with altered body composition, metabolism and decreased biological function.⁽³⁾ Malnutrition is because of imbalance in food intakes and needs, resulting in several disorders like immunosuppression, increased susceptibility to infections, delay wound healing, increased drug intolerance and death.⁽⁴⁾ Malnutrition in gastrointestinal (GI) surgery is due to decreased oral intake, pre-existing chronic disease, tumour cachexia, impaired absorption due to obstruction, and previous bowel resection. Moreover, low socio-economic status, as often seen in elderly and handicapped patients, represents an additional risk factor.⁽⁵⁾

It is well established that malnutrition is associated with poor outcomes in critically ill adults. Contributing factors include malnutrition induced myocardial dysfunction, vascular endothelial dysfunction, immune suppression, insulin resistance and lipolysis

Aims

To study the association of nutritional status and postoperative outcome.

Objectives

To Assess the effect of preoperative nutritional status on postoperative outcomes in patients undergoing abdominal surgery. Following outcome will be assessed: Postoperative complication, Length of hospital stay, Length of ICU stay, Mortality

MATERIALS AND METHODS

Study Site

Department of Surgical Gastroenterology and Liver Transplantation. Sir Ganga Ram Hospital, New Delhi, India

Inclusion Criteria

All patients who underwent major elective and emergency abdominal surgery.

Major Surgery

Major surgery requires hospitalization and specialized care, is usually prolonged, has more risk, involves major body organs or life-threatening situations, and has a greater risk for postoperative complications. Exploratory Laparotomy, hepato pancreatic biliary surgery, Upper GI surgery, Abdomino-perineal Resection

Exclusion Criteria

- Liver transplantation -both donor and recipients
- Patients with chronic liver disease, chronic kidney disease.
- Patients on immunosuppression.
- Patients on Artificial nutrition, dialysis

Sample Size

Sample size was calculated to estimate the influence of calculation individually for patients at nutritional risk and normal patient whose incidences have been reported as 40% and 15% respectively. Required sample size with a confidence interval of 95% and precision of 5% were found to be 365 and 196 respectively. Thus, a total of 561 cases will be required to conduct the study.

Study Design

Prospective Observational analytical study

AIMS AND OBJECTIVES

Study Duration

October 2022 to April 2024

Methodology**Selection of Patients**

This is a prospective observational study; In this study, consecutive patients who underwent major gastrointestinal surgery with exclusion of the patients as per the criteria mentioned above were included in the study.

Methods

The nutritional status of each patient was assessed on admission according to Nutrition Risk index. The Nutritional status of the patient can be assessed by various methods the easy one is Nutritional risk index also known as buzby index which will be calculated as follows:

$$1.519[\text{Serum albumin}] + 41.7[\text{Actual weight/Ideal weight}]$$

With these patients were classified into four categories normal 100, mild (97.5-100), moderate (83.5-97.5) and severe (<83.5).

All patient's pre-and postoperative variables were analysed. Preoperative variables like age ($\geq$ or $<$ 70), sex, organ system involved (luminal/HPB), type of disease (malignant/benign), Charlson's comorbidity score ($>$ or $<$ 1, mean score), nutrition status, and postoperative variables like hospital stay ($>$ or $<$ 10, mean days), ICU stay, morbidity according to Clavien - Dindo classification, and mortality were analysed.

Outcome Variables

1. Postoperative complications were graded according to Clavien Dindo classification.
2. Post op length of ICU stay- total duration of ICU stay following operation expressed in days
3. Length of hospital stay - total duration of hospital stay following operation expressed in number of days
4. Operative mortality- defined as death due to any cause following operation during the course-of hospital stay.

The post-operative complications were assigned an objective grade according to the Clavien- Dindo grading system. The worst complication during the entire postoperative course of hospital or the 30-day follow up period was assigned a particular Clavien-Dindo grade and entered in the excel sheet.

Post-operative length of stay (LOS): Duration of the hospital stay from the day of undergoing surgery (Day 0) to the day of discharge from hospital (day x).

Length of ICU stay: Total post-operative duration of ICU stays taking the day of surgery as day 0.

Operative mortality: post-operative death in the same admission or within 90 days of procedure

Statistical Methods

Statistical testing was conducted with the statistical package for the social science system version SPSS 20.0. Chi square and Fisher exact tests were used to compare qualitative variables. Odds ratios were estimated to study the effect of nutritional status on postoperative outcome. Linear regression was used to establish the relationship between weight loss and length of hospitalization, length of ICU stay and mortality. A p value $<$ 0.05 was considered statistically significant.

RESULTS

From October 2022 to April 2024, seven hundred and one patients underwent major gastro intestinal surgical operations in Department of Surgical Gastroenterology and Liver Transplantation that have been included in the study.

Patient Demographics and Characteristics

There were 420 males and 281 females in the study group. The age group ranged from 1 to 96 years with the median age of 48.5 years. The BMI of the patients were 24.22 ± 4.73 (Mean $\pm$ SD). About 71% of the patients in the study were having Charlson's co-morbidity score less than 3. Majority of operated patients (90.4%) were of ASA grade less than or equal to 2. The history of smoking and alcohol consumption was present in 39.3% and 31.1 % of patients respectively.

Intra-operative Variables

Most of the patients underwent elective surgery (76.8%) and by open route (85.2%). The duration of surgery ranged between 120-870 min with a mean duration of 248.3 ± 120 (mean $\pm$ SD) min. The mean $\pm$ SD blood loss of 231.0 ± 301.14 ml. Thirty percent of patients needed intraoperative blood transfusion.

Primary Outcome Variable**Post-operative Complications**

Majority of the patients (81.1%) had less than grade III complications; However, about 18.4% of patients developed grade III or more severe post-operative complication. Thirty-three patients in the study group died post-operatively; Of which 6 were following elective and 27 were following emergency operations.

Table 1. Clavien Dindo Severity Grade of Post-operative Complications of the Patients

Clavien Dindo grade of post-operative complication	N	Percentage
0	207	29.53
I	115	16.41
II	249	35.52
III	65	9.27
IV	32	4.56
V	33	4.71

Secondary Outcome Variables

The median length of ICU stay was 0 days (range 0-70 days) and median length of hospital stay was 9 days (2-84 days)

Pre-operative Variables and Severity of Post-operative Complications

The pre-operative variables (Table 2) like age, sex, BMI, Pre op serum albumin level, CCI score, ASA score, smoking, alcohol consumption, and pathology (Benign or malignant) in predicting the severity of post-operative complications of Clavien-Dindo grade $<$ 3 or 3-5 were examined. Pre op serum albumin level, ASA, Smoking were found to be statistically significant in predicting the severity of post-operative complications with $p < 0.001$

Of all the intra operative variables examined in the study the nature of surgery, Type of surgery, blood loss and the need for blood transfusion were statistically significant in predicting the severe post-operative complication

Correlation between intraoperative variables and the severity of post-operative complication (Table 2)

SI no.	Intra operative variables	Clavien Dindo severity $<$ 3	grade	Clavien severity 3-5	Din do grade	p
1	Nature of surgery	Emergency	102	60		$<$ 0.001
		Elective	469	70		
2	Type of surgery	Open	477	125		$<$ 0.001
		Laparoscopic	94	5		
		Yes	150	63		$<$ 0.001
4	Need for blood transfusion	No	421	67		$<$ 0.001

5	Duration of surgery (mean +/- SD)	244.96 119.16	+/-	262.90 123.0	+/-	0.02 4
6	Blood loss (mean +/-SD)	200.88 218.69	+/-	363.39 509.00	+/-	<0.0 01

Severity of complications during the hospital stay in patients admitted to the hospital according to the NRI (Buzby index) (Table 3)

Buzby Index	Clavien Dindo severity grade <3	Clavien Dindo severity grade 3-5	p
Normal	20	0	<0.001
Mild	98	12	
Moderate	240	42	
Severe	213	76	

CONCLUSION

Abnormal Nutritional risk index in patients undergoing major gastrointestinal surgery predicts severe post-operative complications, prolonged ICU and hospital stays

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