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Original Research Article

Nutritional Support Following Emergency Laparotomy: A Retrospective Cohort Study from the Surgical Ward at Shyam Shah Medical College, Rewa, Madhya Pradesh

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Abstract

Background: While adequate nutrition after major abdominal surgery is linked to fewer postoperative complications and shorter hospital length of stay (LOS) after elective procedures, there is a paucity of research focusing on the adequacy of nutrition following emergency laparotomies (EL).

Aims and Objectives: To examine the correlation between sufficient nutrition and improved outcomes, such as decreased postoperative complications and shorter hospital LOS, following emergency procedures, specifically after EL in the surgical ward of Shyam Shah Medical College in Rewa, Madhya Pradesh.

Materials and Methods: To conduct the study, retrospective data from 200 adult patients who underwent EL between January 2022 and December 2022 at Shyam Shah Medical College in Rewa, Madhya Pradesh, were analyzed. The focus was evaluating nutrition adequacy and identifying complications during the first ten days after the surgery.

Results: The results revealed that 50% (100 patients) achieved overall nutrition adequacy of at least 80% during the initial ten postoperative days. Patients who received adequate nutrition, surpassing 80% of the recommended caloric intake, achieved their nutritional targets by the second day after the operation. Conversely, patients who received lower nutrition delivery, falling below 80% of the calculated calories, increased their caloric intake during the first five postoperative days but failed to reach the desired 80% level. Multivariate analysis indicated that not achieving 80% nutrition adequacy was associated with postoperative ileus, loss of appetite, and higher individual energy requirements.

Conclusion: During the first few postoperative days after EL, inadequate nutrition supply is a typical complication. Oral nutrition is the best way to start feeding this population in the surgical ward. Careful monitoring of nutritional supplementation is essential for people who cannot eat orally.

Keywords: Laparotomies, Nutrition, Caloric Intake, Nutrition Adequacy.

Introduction

Postoperative nutrition plays a vital role in promoting recovery and reducing complications post-major abdominal surgery. Adequate nutrition has been shown to shorten hospital stays and improve wound healing and tissue recovery [1]. Implementing enhanced recovery after surgery (ERAS) programs in elective surgical settings have underscored the importance of perioperative nutrition delivery [1, 2]. These programs have also been extended to emergency surgery patients, highlighting the significance of postoperative nutrition in these cases [3, 4, 5]. Preoperative nutrition optimization is essential to ERAS protocols, particularly for patients with compromised nutritional status, as they are more prone to postoperative complications [6]. However, preoperative nutritional adjustments may not be feasible in emergency settings, making postoperative nutrition even more crucial [6]. Therefore, early assessment of baseline nutritional status is essential.

Nutritional supplementation is required when oral intake is not tolerated [1,7], even though early oral nutrition is suggested for all postoperative patients. Nutritional sufficiency following elective abdominal surgery has been the subject of numerous investigations, but the short-term effects of EL have received less attention [7,8]. More research is needed to assess in-hospital nutrition adequacy in EL patients, even though it is known that adequate nutrition after surgery is crucial for these patients [9]. While studies have looked at calorie intake throughout the recovery phase [10, 11], most have focused on the best time to start eating again. Thus, this study aimed to evaluate the sufficiency of postoperative nutrition in the surgical ward following EL and to determine characteristics associated with optimal nutrition supply.

Materials and Methods:

This observational retrospective single-center study was conducted at Shyam Shah Medical College in Rewa, Madhya Pradesh.

The study participants were adults (those aged 18 and above) who had EL at Shyam Shah Medical College in Rewa, Madhya Pradesh, between 2022 and 2023. The analysis did not include patients who required ICU admission past the first postoperative day. Two hundred and fifty patients initially met the inclusion criteria. However, five were omitted because of incomplete data.

After surgery, patients had their nutrition evaluated between day one and day 10. Medical records were consulted to determine the total daily caloric intake from nutritional assistance, including intravenous dextrose, parenteral, and enteral nutrition. Calories consumed orally were estimated using daily food consumption in milliliters and the average hospital diet (1800 kcal/day) as a reference. "enteral nutrition" refers to feeding through a nasogastric tube, while "oral intake" refers to eating normally. Using the ESPEN recommendations for postoperative patients [1], we calculated a daily caloric need of 30 kcal/IBW. The Devine formula was used for men, while the Robinson formula was used for women to determine the ideal body weight [12]. During the observation period, oral intake, enteral nutrition, parenteral nutrition, and dextrose calories were added together to determine an individual's cumulative caloric count.

Each patient's nutrition adequacy % was determined by taking their total calories consumed during the follow-up period and dividing by their length of stay in days multiplied by their initial body weight in kilograms multiplied by 30 (Kcal/(kg*d)).

Prior research on patients undergoing elective major abdominal surgery has shown that during the immediate

postoperative phase, dietary adequacy exceeds 80% of the anticipated individual need [2, 13]. So, we set 80% dietary sufficiency as the vital endpoint. Patients were regarded to be preoperatively malnourished if their nutrition-related index (NRI) was less than 97.5, as published by Parhar et al. [12]. Patients who denied a meal at least once due to nausea, gastrointestinal pain, or loss of appetite were documented. Patients who obtained more than 80% of the estimated energy need were classified as "group adequate," whereas those who received less than 80% were classified as "group low." The CRP/albumin ratio was calculated using surgical day 2 test findings to evaluate metabolic recovery.

Medical records revealed that the patient experienced postoperative problems throughout their hospital stay. Medical and surgical complications were distinguished. Fascial dehiscence, wound infection, wound hemorrhage, seroma, anastomotic leak, intraabdominal abscess, and ileus were some complications after surgery. The list of medical consequences includes respiratory failure, pneumonia, pulmonary embolism, transient ischemic attack (TIA), high-output stoma, renal failure, liver failure, CPR, atrial fibrillation (FA), and sepsis. When there was a problem with breathing and oxygenation, doctors called it "respiratory dysfunction."

Results

A total of 200 patients were analyzed, and the results showed that 100 (50%) reached the goal of 80% nutrition adequacy in the postoperative follow-up period. These patients were classified as the "group adequate." Bowel obstruction was the leading admission diagnosis for both the adequate and low groups, affecting 98 and 76 patients, respectively. However, getting to the 80% dietary adequacy level was independent of the admission diagnosis.

Patients in the sufficient group tended to be younger, more likely to be female, to weigh less, to have a lower ideal body weight (IBW) than patients in the low group, and to have a lower incidence of malignancies. The inpatient LOS for the group considered adequate was also less than that of the group considered low (8 days vs. 10 days), as was the postoperative LOS (6 days vs. 7 days). Even though hospital deaths were uncommon, those in the sufficient group had a better chance of getting released from the hospital alive. Both groups had a similar prevalence of underweight individuals before surgery. Other patient demographic factors (Table 1) showed no significant differences between the study groups.

Table 1: Patient Demographics

Parameters	Group adequate N=100	Group low N=100
Male gender	110	90
Weight	70 (60-82)	73 (65-85)
Admission diagnosis		
Bowel obstruction	52	48
Peritonitis	28	26
Bowel ischemia	8	14
Malignancy	7	8

Patients in the "group adequate" category reached the targeted 80% level of dietary sufficiency as early as the second postoperative day. However, despite a modest increase in the administered energy intake throughout the preliminary stage of the follow-up period, the patients in the "group low" did not exceed this threshold. Patients in the "group low" did not see an increase in nutritional support over time, and their poor oral intake persisted despite this.

Patients in the "group adequate" required fewer calories per day than those in the "group inadequate" [1745 kcal (1608-1978) vs. 2005 (1706-2195), P 0.001]. While they consumed fewer calories through parenteral feeding (42 kcal vs. 125 kcal, P = 0.014), they consumed more calories orally (1238 vs. 1710; P 0.001) than the "group low." In terms of giving enteral nutrition, there was no statistically significant difference between the two groups [2 (0.9) vs. 3 (1.6), P = 0.533]. Both groups experienced a high rate of nausea and stomach pain, although there were no statistically significant differences (Table 2).

Table 2: Nutritional characteristics of patients

	Group adequate N= 100	**group low N =100**
Calculated daily energy demand	1745 (1608-1978)	2005 (1706-2195)
Cumulative daily calories	1753 (1530-1890)	1138 (711-1360)
Administered daily 5% dextrose (kcl)	200	189
Administered daily Pn	42	125
Administered daily oral intake	1440	836
Nausea or gastric pain	85	62
Loss of appetite	66	102

There were 70 cases of surgical complications in the "group low," while there were only 50 in the "group adequate." In contrast, no significant differences were seen in the occurrence of medical issues between the two groups in the study. Patients in the "group low" were more likely to experience complications like pneumonia, ileus, and kidney failure. High-output stomas occurred more frequently in the "group adequate," albeit their overall incidence was low (Table 3).

Table 3 Postoperative complications

Complication	**Group adequate**	**Group low**
Surgical complication	50	70
Fascial dehiscence	6	12
Wound infection	12	32
Wound bleeding	2	10
Seroma	01	16
Anastomotic leak	0	9
Intra-abdominal abscess	0	14
Ileus	3	20
Re-operation	0	14
Respiratory dysfunction	3	22
Pneumonia	2	8
Pulmonary embolus	0	6
High-output stoma	5	3
Kidney dysfunction	01	06
Liver dysfunction	00	13
Sepsis	03	19

The logistic regression study uncovered several factors that increase one's likelihood of getting less than 80% of their estimated energy needs. Postoperative ileus (OR = 3.0, 95% CI = 2.0-20.0), anorexia (OR = greater daily energy requirement (OR = 2.5, 95% CI = 1.3.-4.6), and not eating on the first postoperative day (OR =

1.8, 95% CI = 0.7-2.1) were all were associated with an increased risk of complications. These were found to be significant predictors of falling short of nutritional goals.

Discussion

The key finding of the current study was that after emergency laparotomy (EL), barely half of the patients met their estimated energy needs. Nutritional adequacy was found to improve with earlier commencement of oral intake, but nutritional support failed to adequately satisfy the calorie needs of patients who were unable to eat. This is the first investigation to evaluate the sufficiency of postoperative nutrition in a surgical hospital after EL.

Early oral feeding is safe in planned and unplanned abdominal operations [1, 7, 10]. Furthermore, Enhanced Recovery following Surgery (ERAS) and standard recovery settings have associated initiating oral intake on the first day following elective colorectal surgery to lower problems and shorter hospital stays [4, 14, 15]. Our research lends credence to the idea that promoting oral intake from the earliest stages of recovery is a good idea since it improves nutritional adequacy compared to just depending on nutritional support. Since optimizing a patient's nutritional state before EL is often difficult or impossible, early oral intake may be even more important in EL. Our results corroborate earlier research showing a link between proper nutrition and shorter hospital stays in emergency and elective care settings [7]. The C-reactive protein (CRP)/albumin ratio was higher on postoperative day 2 in the group with inadequate nutrition. This suggests that patients with poor nutrition may have slower metabolic recovery or that severe inflammation predisposes them to poor nutrition after surgery. However, caution is required when extrapolating causality from this finding.

The role of nutritional support in meeting patients' nutritional demands was small in our study, and the caloric intake provided by nutritional support remained low throughout the follow-up period. When relying exclusively on nutritional support, nutritional adequacy has been observed in acute care settings to be as low as 26-32% of the predicted demand [16]. Our research shows that the role of nutritional assistance in providing food is much smaller. One possible explanation for this difference is that nutritional support is typically employed in the intensive care unit (ICU), which used to commence most of a patient's feeding [17]. Also, central venous catheters for the administration of hyperosmolar intravenous feeding solutions are less commonly used in general surgery wards. Our research showed that nutritional supplementation did not result in an increase in caloric intake over time. The doctors on hand thought more nutritional support wasn't essential because they expected the patient to start eating orally soon. However, for patients unable to tolerate oral intake during the initial days of recovery, nutritional assistance should be gradually raised to obtain optimal nutrition levels. More than a third of patients in either group were malnourished before surgery. Patients with poor baseline nutritional status benefit more from nutritional support. ERAS protocols cannot be implemented preoperatively in emergency settings [1], an important consideration for surgical ward patients after EL. In studies of ERAS protocols in elective patient settings, multidisciplinary teams and individualized nutrition protocols have been shown to boost caloric intake [18]. Nutritional support for EL patients may be improved using these methods. Few patients in our cohort were given enteral feeding. We found that patients with preexisting malnutrition or those without oral intake on the first postoperative day benefited from a "Nutrition Treatment Bundle" that is now standard practice. This package could include Bolus enteral

nutrition, energy-rich enteral solutions, and regular consultation with a nutrition therapist. Intermittent boluses of enteral nutrition, as opposed to continuous infusions, have been found to enhance the total amount of enteral nutrition given in the intensive care unit [19].

A logistic regression study found that postoperative ileus, loss of appetite, increased daily energy requirement, and no oral intake on a postoperative day one were all significant risk variables for falling short of 80% nutrition adequacy. Our findings on postoperative ileus prevalence [20] align with the studies mentioned earlier. To avoid complications such as ileus after surgery, early oral nutrition beginning is emphasized in ERAS protocols [20]. Patients recovering from EL may also benefit from early oral nutrition since those with higher nutrition adequacy began oral nourishment sooner and had a lower incidence of ileus. Providing patients with their favorite food, chewing gum, and food-related programs has been shown in previous trials to reduce the length of postoperative ileus following elective colorectal surgery [13, 20].

Similarly, considering patients' food choices and implementing individualized meal times has increased nutritional adequacy among general hospital populations [18, 21]. These interventions could be helpful in the EL setting as well. Our research found an association between malignancy and inadequate dietary intake. Inflammatory indicators are known to suppress appetite [12], and previous research has demonstrated that tumors can release these signals. Thus, malignant EL patients may be at a higher risk for postoperative underfeeding.

The results of our research emphasize the need to provide nutritional support to patients with insufficient or no oral intake. The influence of increased parenteral feeding on postoperative outcomes is unknown. However, it has the potential to improve nutrition adequacy in such cases. Although the use of parenteral nutrition in the first postoperative week is still debated [1, 17], our findings highlight the importance of careful monitoring of nutritional assistance in surgical wards to ensure adequate nutrition.

There are several caveats to this study. This is a retrospective cohort study. Thus there is always the possibility of bias. Our study cohort also included many EL patients, contributing to the inherent uncertainty. Using logistic regression analysis, we aimed to lessen the impact of these restrictions. In addition, while it would have been beneficial to include ICU patients in the study, comparing results from the ICU and surgical ward settings would have been difficult due to the substantial disparities in feeding standards between the two settings [1, 22]. This retrospective study's calorie counting methodology depended on patient records, which may have had errors. Only a prospective study design can yield reliable information about the number of calories eaten orally.

Meaning in Clinical Practice: This study fills a gap in the literature by shedding light on the level of nutritional adequacy in surgical wards after EL. Our results illustrate the widespread issue of poor nutrition following EL. The best way to ensure adequate nutrition after surgery is to take food and liquids orally as soon as possible. Improving appetite and preventing or treating ileus should be given particular focus. Routine central venous catheter placement, tighter nutrition supply monitoring, and multidisciplinary nutrition teams may improve nutrition adequacy in patients who rely primarily or exclusively on nutritional support [23].

Conclusion

Adequate nutrition following EL is essential since it reduces the risk of complications and shortens the time spent in the hospital. Previous data on elective surgery suggests emphasizing beginning

oral feeding as soon as possible [1]. Since this patient population appears to be undernourished, it is important to monitor their nutritional support.

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