Research Article

Postoperative nutrition practices in abdominal surgery patients in a tertiary referral hospital Intensive Care Unit: A prospective analysis

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Abstract

Background: Benefit of early enteral feeds in surgical patients admitted to Intensive Care Units (ICUs) has been emphasized by several studies. Apprehensions about anastomotic leaks in gastrointestinal surgical patients prevent initiation of early enteral nutrition (EN). The impact of these practices on outcome in Indian scenario is less studied. **Aims:** This study compares the impact of early EN (within 48 h after surgery) with late EN (48 h postsurgery) on outcomes in abdominal surgical ICU patients. **Settings and Design:** Postabdominal surgery patients admitted to a tertiary referral hospital ICU over a 2-year period were analyzed. **Methods:** Only patients directly admitted to ICU after abdominal surgery were included in this study. ICU stay >3 days was considered as prolonged; with average ICU length of stay (LOS) for this ICU being 3 days. The primary outcome was in-patient mortality. ICU LOS, hospital LOS, infection rates, and ventilator days were secondary outcome measures. Acute Physiology and Chronic Health Evaluation II scores were calculated. SPSS and Microsoft Excel were used for analysis. **Results:** Of 91 ICU patients included, 58 received early EN and 33 late EN. Hospital LOS and infection rates were less in early EN group. Use of parenteral nutrition (odds ratio [OR] 5.25, 95% confidence interval (CI); P = 0.003) and number of nil-per-oral days (OR 8.25, 95% CI; $P \leq 0.001$) were other predictors of prolonged LOS. **Conclusions:** Early EN in postabdominal surgery ICU patients was associated with reduced hospital LOS and infection rates. ICU LOS, duration of mechanical ventilation and mortality rates did not vary.

Keywords: Hospital mortality, infection rates, nutrition, outcomes

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Introduction

Initiating early enteral feeds in surgical patients admitted to Intensive Care Units (ICUs) has been emphasized by many multi-center trials and the same have been formulated as the ASPEN guidelines, its timing still remains subject to considerable practice variation.[1] Data about the implementation of these guidelines are limited in India.

Several studies have shown a trophic effect of enteral nutrients on the integrity of the gut mucosa. This has been the rationale for instituting enteral nutrition (EN) early in critically ill patients, but the importance of the same in the postoperative patients is overlooked.[2] Apprehensions about anastomotic leaks remain the most common cause for delaying enteral feeds in abdominal

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surgical patients.[3] Early EN has been associated with lower morbidity and reduced incidence of infection in general hospitalized patients.[4] Several observational studies conducted in various other countries have also documented the variable EN practices in the critically ill group.[4-6] Early initiation of parenteral nutrition has been proven to cause more harm than benefit in well-nourished patients coming for emergency surgeries.[7]

This study analyses prospectively the impact of early (<48 h) enteral feeds (EN) versus delayed (>48 h postsurgery) enteral feeds on the outcomes in patients admitted to ICU following abdominal surgeries.

Methods

Design

The computerized data and original case records of patients admitted between August 2012 and August 2014 to our ICU were reviewed. Demographics, Acute Physiology and Chronic Health Evaluation II (APACHE II) score at the time of arrival in ICU, Glasgow Coma Scale (GCS) score, type of surgery, ICU and hospital outcomes, ICU and hospital length of stay (LOS), and the time and type of feeding initiated, ICU and hospital mortality rates were noted and tabulated. The durations were calculated as a number of calendar days, with day of admission being considered day 1.

Enteral feed initiation was considered early if it was initiated within 48 h postsurgery. Ventilator days, the incidence of infection, ICU LOS, and hospital LOS between early and late enterally fed patients were compared. Furthermore, analysis was done to note differences in nutrition practices in gastrointestinal anastomotic surgeries with nonanastomotic surgeries and its impact on the outcome measures. APACHE II score at the time of arrival in ICU was calculated for all patients. The study was approved by the Hospital Ethics Committee. Multivariate analysis was performed to assess the impact of timing of enteral feeds on ICU and hospital LOS.

Data collection

All consecutive patients admitted immediately to the ICU after abdominal surgery over a 2-year period (August 2012 - August 2014) were included for the study. Patients with a history of previous abdominal surgery but admitted to the ICU for other reasons, admissions to the ICU after being shifted to the ward postsurgery and ICU referrals after surgery in other hospitals were excluded from this study.

The primary outcome measure is patient mortality while ICU LOS, hospital LOS, the incidence of infection and ventilator days were the main secondary outcome measures.

ICU stay >3 days was considered as prolonged; with average ICU LOS for this ICU being 3 days. Parenteral nutrition was initiated in a small subset of patients.

Statistical analysis

SPSS and Microsoft Excel were used for statistical analysis. Continuous variables presented in descriptive fashion (mean ± standard deviation or median with range) were compared using *t*-tests. Medians and interquartile ranges are given. Categorical variables expressed as absolute, and relative frequencies were compared using Chi-square tests. Linear correlation was performed to test for associations between the Late EN practice to ICU LOS, Hospital LOS and incidence of infection. Univariate and multivariate analyses showed if Late EN was an independent predictor of prolonged hospital stay. Results of prediction are expressed as odds ratios (ORs) and 95% confidence intervals (CIs). $P \leq 0.05$ were considered statistically significant.

Results

Of 91 ICU patients admitted immediately after abdominal surgeries, 58 were started on early EN (<48 h) and 33 received late EN (>48 h). A small subset of nine patients received parenteral nutrition in addition.

Table 1 summarizes the baseline patient characteristic. Comparison of demographic data between the two

Table 1: Baseline patient characteristics

Enteral feeding practice	Early (<48 h)	Late (>48 h)	*P*
Number	58	33	
Age (years)	58.8±2	63.7±3	0.17
Sex (%)			
Male	39 (67)	23 (70)	0.97
Female	19 (33)	10 (30)	
APACHE II score	11.1±0.8	12.4±1	0.33
GCS score	14.1±0.3	13.6±0.43	0.31
Co morbidities, *n* (%)			
Diabetes	20 (34)	12 (36)	0.86
Hypertension	32 (55)	13 (39)	0.15
Type of surgery, *n* (%)			
Emergency	43 (74)	27 (82)	0.39
Elective	15 (26)	6 (18)	
Laparoscopic	26 (45)	11 (33)	0.28
Open	32 (55)	22 (67)	
Anastomotic	30	28	<0.001
Nonanastomotic	28	5	
Parenteral nutrition	1 (2)	9 (27)	<0.05

Values are expressed as mean±SEM, where appropriate. APACHE: Acute Physiology and Chronic Health Evaluation; GCS: Glasgow Coma Scale; IHD: Ischemic heart disease; SEM: Standard error of mean

groups revealed no significant differences with regards to age, sex, APACHE II score, and GCS. There was no significant difference in the type of surgery (laparoscopic vs. open) or the timing of surgery (emergency versus elective) between the groups.

Initiation of EN was more likely delayed in patients who had undergone anastomotic surgeries (3.3 ± 0.43 vs. 1.7 ± 0.19; $P < 0.001$) suggesting apprehensions about anastomotic leaks as the most common cause for such a practice.[3] Hospital LOS (9.1 ± 0.87 days versus 14.3 ± 1.18 days; $P < 0.0001$) and infection rates (10 [17%] vs. 16 (48%); $P < 0.05$) were less in the early EN group. A direct correlation was noted between the timing of feed and hospital LOS ($r = 0.41$ vs. $r = 0.18$; $P < 0.001$). There was a significant correlation in the regression analysis as shown in Figure 1. Other independent predictors of prolonged hospital stay were the use of parenteral nutrition (OR 5.25, 95% CI; $P = 0.003$) and the number of nil-per-oral (NPO) days (OR 8.25, 95% CI; $P \leq 0.001$). The ventilator-free days was noted to be higher in the delayed EN group. Parenteral nutrition was started in a larger proportion of patients in delayed EN group. ICU LOS (3.4 ± 0.68 days and 4.5 ± 0.58; $P = 0.22$), duration of mechanical ventilation (1.6 ± 0.7 days versus 2.6 ± 0.7 days; $P = 0.304$) and the mortality rates were similar in both groups [Table 2].

The distribution of a number of patients by timing of feeding and the mean hospital LOS is shown in Figure 2.

Discussion

Nutrition plays an integral role in the management of postsurgical patients, but its type and timing considerably varies in surgical practice.[1] The benefits of the early initiation of EN in surgical patients has now been clearly established.[2] The main goals of perioperative nutritional support are to minimize negative protein balance by avoiding starvation, with the purpose of maintaining muscle, immune, and cognitive function and to enhance postoperative recovery.[3] Postoperative dysmotility predominantly affects the stomach and colon, with the small bowel recovering normal function 4–8 h after laparotomy.[3] Early enteral feeding after abdominal surgery is tolerated and the feed well absorbed.[3]

Several studies have evaluated the impact of starting early EN in postsurgical patients, but the same has not been evaluated in the subgroup of patients undergoing abdominal surgery and requiring ICU admission in the postoperative phase. These patients are susceptible to all the complications associated with ICU stay in addition to the stress of major surgery. Appropriate feeding forms one of the important measures that aids in their recovery. Standardization of nutritional practices in this subgroup of patients may help in preventing high morbidity and improving outcomes.

Table 2: Main findings

Enteral feeding practice	Early (<48 h)	Late (>48 h)	*P*
Ventilation free days	7.6±0.7 (7, 5-9)	11.7±0.9 (11, 8-15)	<0.0001
NPO days	1.3±0.09 (1, 1-2)	5.2±0.59 (4, 3-6)	<0.0001
Initiation of soft diet	3.71±0.44 (3, 2-5)	8.32±0.9 (6, 5-9.5)	<0.0001
ICU LOS (days)	3.4±0.68 (2, 1-4)	4.5±0.58 (4, 3-5.5)	0.22
Hospital LOS (days)	9.1±0.87 (8, 5.75-11)	14.3±1.18 (14, 10-16.5)	<0.0001
ICU mortality, *n* (%)	6 (10)	0	
Hospital mortality, *n* (%)	6 (10)	1 (3)	0.15
Incidence of infection	10 (17)	16 (48)	<0.05
Blood culture positive	3 (5)	6 (18)	
Urine culture positive	5 (9)	2 (6)	
Fungal culture positive	2 (3)	3 (9)	
DET culture positive	0	2 (6)	
Pus culture positive	5 (9)	11 (33)	
Use of parenteral nutrition (%)	1 (2)	9 (27)	
Infection (c/s positive)	1 (100)	8 (89)	
ICU LOS	7	7.6	
Hospital LOS	7	19.3	
Mortality	100	0	

Values are expressed as mean±SEM (median, IQR), where appropriate. ICU: Intensive Care Unit; LOS: Length of stay; NPO: Nil-per-oral; DET: Deep endotracheal; IQR: Interquartile range; SEM: Standard error of mean

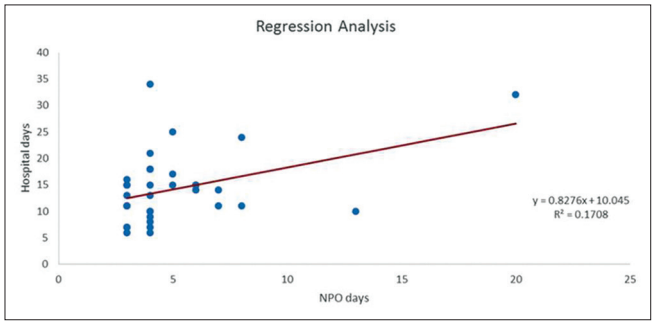

Figure 1: Significant correlation between the timing of feeds and hospital length of stay

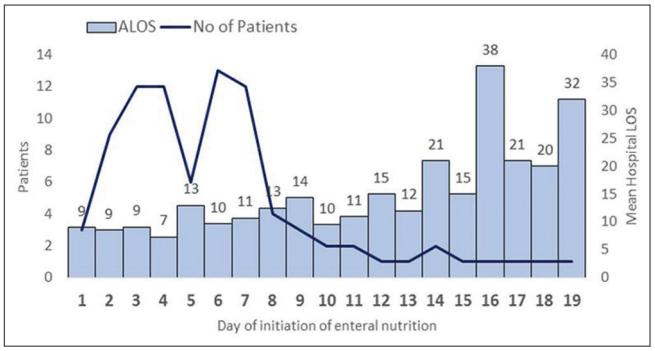

Figure 2: The distribution of number of patients by timing of feeding and the mean hospital length of stay. There was a direct correlation between the two ($r = 0.91$; $P < 0.0001$)

Moore *et al*. have conducted a meta-analysis comparing early enteral feeding with parenteral nutrition in the postoperative patients and have found reduced incidence of septic complications when patients were fed enterally, the maximum benefit being in the posttraumatic subgroup of patients.[8]

Supplementing with parenteral nutrition within 1 week of surgery is often said to be associated with several complications, infections being the one carrying significant morbidity and mortality.[4] The decision to start parenteral nutrition is often made based on clinical assessments and apprehension about malnutrition affecting wound healing.[5] The ESPEN guidelines on parenteral nutrition defined criteria for preoperative and postoperative parenteral nutrition in undernourished patients.[9] However, patients with no or less severe malnutrition may actually suffer worse outcomes from the use of parenteral nutrition.[10]

Lewis *et al*. conducted a meta-analysis studying the impact of early EN within 24 h of intestinal surgery versus later commencement of feeding and concluded that there was no obvious advantage in keeping patients NPO following gastrointestinal surgery. Early EN was associated with reduced mortality.[11] Our study aims to look at feasibility of similar practice in the patients who get admitted to ICU postabdominal surgery.

In addition to these studies, the Canadian nutrition guidelines have effectively compiled all the studies relating to the nutritional practices in the critically ill patients and formulated the practice guidelines.[12] The analysis of postabdominal surgical patients in ICU has not been done exclusively in any of the studies and hence their outcomes remain under evaluated.

Early initiation of enteral feeds in abdominal surgery ICU patients was associated with a significant reduction in the hospital LOS with reduced incidence of infections. Delaying enteral feeds were jndependantly related to longer hospital LOS. The study also showed that parenteral nutrition was more likely to be started in patients with anastomotic bowel surgeries, reflecting the possible apprehensions about leaks. A subgroup analysis in these patients revealed that there was a trend towards higher incidence of infections and increased ICU and hospital LOS though not statistically significant. A larger sample size would be needed to explore this aspect.

Limitations/applicability of the study

No objective single tool for preoperative nutritional assessment could be used as this was a retrospective analysis of medical records. All the drawbacks of data retrieval like missing variables and data were our limitations.

Conclusions

The present study, in addition to the existing literature, showed that early EN in postabdominal surgery ICU patients was found to be associated with a reduced hospital LOS and infection rates. ICU LOS, duration of mechanical ventilation and mortality rates did not vary significantly. Adopting a protocolized early EN strategy may help in improving resource utilization.

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Conflicts of interest

There are no conflicts of interest.

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