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Original Research Article

A Comparative Study to Assess the Outcomes of Early Versus Late Enteral Feeding after Major Gastrointestinal Surgeries

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Abstract:

Background: Postoperative fasting has long been standard practice following major gastrointestinal surgeries to minimize nausea, vomiting, and anastomotic stress. However, prolonged fasting exacerbates malnutrition and delays recovery. Emerging evidence supports early enteral nutrition (EEN) in enhancing wound healing, immune response, and reducing postoperative morbidity.

Aim: To compare the clinical outcomes of early versus late enteral feeding in patients undergoing major gastrointestinal surgeries.

Methodology: This prospective observational study included 50 patients aged 18–60 years who underwent elective or emergency gastrointestinal surgeries at Narayana Medical College, Nellore, over 18 months. Patients were divided into two equal groups: Group A received early enteral feeding within 24–48 hours postoperatively, while Group B received delayed feeding after bowel function returned. Postoperative parameters—including paralytic ileus, wound infection, dehiscence, leak, intra-abdominal abscess, gastrointestinal complications, and hospital stay—were compared using chi-square and t-tests.

Results: Early feeding significantly reduced postoperative complications. The incidence of paralytic ileus (16% vs 60%, p=0.001), wound infection (20% vs 48%, p=0.037), wound dehiscence (12% vs 40%, p=0.024), wound leak (4% vs 28%, p=0.021), intra-abdominal abscess (4% vs 32%, p=0.010), and gastrointestinal complications (28% vs 56%, p=0.045) was markedly lower in the early-fed group. Mean hospital stay was significantly shorter with early feeding (6.42 ± 1.9 days vs 10.9 ± 2.5 days, p=0.001).

Conclusion: Early enteral feeding within 24–48 hours after major gastrointestinal surgeries is safe and beneficial. It enhances recovery, reduces postoperative morbidity, and shortens hospital stay, supporting its inclusion in enhanced recovery protocols.

Keywords: Early Enteral Nutrition, Gastrointestinal Surgery, Postoperative Complications, Enhanced Recovery.

Introduction

Postoperative fasting (nil orally) is a standard practice following most gastrointestinal surgeries. Postoperative dysmotility primarily affects the stomach and colon, whereas the small intestine typically regains normal function within 4–8 hours after laparotomy.

Malnutrition is a significant risk factor for postoperative complications, including an increased incidence of infections and prolonged hospitalization. The primary rationale for fasting postoperatively is to minimize the risk of nausea, vomiting, and mechanical stress on the anastomosis, allowing adequate time for healing. However, prolonged fasting can exacerbate nutritional deficits, adversely impacting recovery. [1] Adynamic ileus, a common occurrence after abdominal surgery, results from neuromuscular inhibition and sympathetic overactivity, leading to transient loss of gastrointestinal motility. While small bowel function generally resumes within 24 hours, gastric motility takes approximately 48 hours, and colonic motility typically returns within 3–5 days. Traditionally, postoperative management includes nasogastric decompression until bowel function is restored, followed by a gradual transition from a liquid diet to a regular diet over 4–5 days. [2]

Gastrointestinal surgery is associated with a range of postoperative morbidities, including wound infections, anastomotic leakage, intra-abdominal sepsis, and systemic complications. Malnutrition exacerbates postoperative morbidity, prolongs hospital stay, and increases healthcare costs. Although delayed feeding is often implemented to reduce mechanical stress on the anastomosis, gastrointestinal

secretions amounting to approximately 6–8 liters per day are present at the anastomotic site, irrespective of the timing of enteral nutrition. [3]

Nausea and vomiting are more frequently observed following upper gastrointestinal surgery compared to resections of the small intestine and colon. However, there is no scientific evidence supporting the notion that bowel rest and postoperative fasting contribute to improved wound healing or anastomotic integrity.

On the contrary, research suggests that early luminal nutrition can enhance wound healing, strengthen anastomotic and perforation repair, and promote a more favorable healing trajectory, particularly in malnourished patients. While pre-existing nutritional depletion is a significant risk factor for postoperative complications in gastrointestinal surgery, it is not the sole determinant. Therefore, restricting early postoperative enteral feeding solely to malnourished patients is not supported by current evidence. [4]

Clinical evidence indicates that early postoperative feeding offers several benefits, including the reversal of starvation induced mucosal atrophy and enhanced collagen deposition at surgical sites, thereby promoting wound healing. Additionally, early enteral nutrition has been associated with a reduction in septic morbidity, further supporting its role in improving postoperative outcomes. Given the evidence supporting the benefits of early feeding, this study aims to provide further insights into its role in optimizing patient outcomes following major gastrointestinal surgery.

Aim: To compare the outcomes of early versus late enteral feeding after major gastrointestinal surgeries.

Objectives: 1. To assess the impact of early postoperative enteral nutrition (initiated within 48 hours, including oral intake or enteral feeding via gastric, duodenal, or jejunal routes) compared to delayed nutritional support in patients undergoing major gastrointestinal surgeries. 2. To evaluate whether early enteral feeding is associated with a shorter length of hospital stay. 3. To determine the incidence of postoperative complications, including wound infection, wound dehiscence, and other morbidity markers, in patients receiving early versus late enteral feeding.

Materials & Methods

This was a Prospective observational study done on 50 patients, selected using consecutive non-probability sampling. The patients were divided into two groups of 25 each, with one group receiving early enteral feeding in the department of General Surgery, Narayana Medical College & Hospital, Nellore, Andhra Pradesh over 18 months period.

Inclusion Criteria: Patients aged 18 to 60 years undergoing gastrointestinal surgery (both elective and emergency) and who were hemodynamically stable postoperatively.

Exclusion Criteria: Patients younger than 18 years or older than 60 years and unstable postoperatively.

Statistical Analysis: Data from the questionnaires was entered in MS Excel 2016 and was analyzed using SPSS Software version 20. Data is represented in the form of frequencies and percentages with the help of tables, bar diagrams and pie diagrams. Categorical variables are presented in numbers and percentages (%) and continuous variables are presented as mean ± SD and median.

Study Procedure: Patients undergoing major gastrointestinal surgeries, both elective and emergency, were enrolled in the study based on predefined inclusion and exclusion criteria. Written informed consent was obtained from all participants before enrollment. A detailed medical history was recorded, followed by a thorough clinical examination for each patient. All patients underwent comprehensive preoperative investigations, including a complete haemogram, blood sugar levels, renal function tests, serum electrolytes, liver function tests, electrocardiogram (ECG), chest X- ray, and abdominal imaging (X-ray abdomen erect, ultrasound of the abdomen and pelvis). When indicated, computed tomography (CT) of the abdomen and pelvis was also performed. Additionally, all patients were screened for HIV I and II, and blood grouping and typing were conducted. Surgery was performed as per the planned approach, either elective or emergency.

Postoperative Feeding: Study Group: Early enteral feeding was initiated within the first 24-48 hours postoperatively, administered via a nasogastric tube, feeding jejunostomy, or orally.

Control Group: Patients remained nil by mouth with nasogastric decompression until bowel function returned. A liquid diet was then introduced and gradually advanced to a regular diet over 4–5 days.

Outcome Assessment: The postoperative outcomes were evaluated and compared between the two groups based on the incidence of paralytic ileus, wound dehiscence, wound infection, gastrointestinal complications, intra- abdominal abscess formation, and length of hospital stay after surgery. Follow-up: Patients were provided with specific discharge instructions and scheduled for periodic follow-up reviews to monitor their postoperative progress.

Results

Table 1: Age wise distribution [n=25]

Age	Early	%	Late	%	Total	%
< 30	5	20.0	3	12.0	8	16.0
31- 40	7	28.0	4	16.0	11	22.0
41-50	5	20.0	5	20.0	10	20.0
51-60	4	16.0	6	24.0	10	20.0
61-70	3	12.0	5	20.0	8	16.0
> 70	1	4.0	2	8.0	3	6.0
Total	25	100.0	25	100.0	50	100.0
Chi – square = 2.55 p=0.769 (not significant)						

Table 2: Gender wise distribution [n=25]

Gender	Early	%	Late	%	Total	%
Male	20	80.0	21	84.0	41	82.0
Female	5	20.0	4	16.0	9	18.0
Total	25	100.0	25	100.0	50	100.0
Chi – square = 0.13 p=0.713 (not significant)						

Table 3: Distribution based on procedure done [n=25]

Surgery	Early	%	Late	%	Total	%
Right hemicolectomy	2	8%	2	8%	4	8%
Gastrojejunostomy	3	12%	2	8%	5	10%
Small bowel obstruction	10	40%	9	36%	19	38%
Hollow viscus perforation	7	28%	8	32%	15	30%
Sigmoid volvulus	3	12%	4	16%	7	14%
Total	25	100%	25	100%	50	100%

Table 4: Distribution based on incidence of Paralytic ileus [n=25]

Paralytic ileus	Early	%	Late	%	Total	%
Absent	21	84.0	10	40.0	31	62.0
Present	4	16.0	15	60.0	19	38.0
Total	25	100.0	25	100.0	50	100.0
Chi – square = 10.27 p=0.001* (significant)						

Table 5: Distribution based on wound infection [n=25]

Infection	Early	%	Late	%	Total	%
Absent	20	80.0	13	52.0	33	66.0
Present	5	20.0	12	48.0	17	34.0
Total	25	100.0	25	100.0	50	100.0
Chi – square = 4.36 p=0.037* (significant)						

Table 6: Distribution based on Wound dehiscence [n=25]

Dehiscence	Early	%	Late	%	Total	%
Absent	22	88.0	15	60.0	37	74.0
Present	3	12.0	10	40.0	13	26.0
Total	25	100.0	25	100.0	50	100.0
Chi – square = 5.09 p=0.024* (significant)						

Table 7: Distribution based on Wound leak [n=25]

Wound leak	Early	%	Late	%	Total	%
Absent	24	96.0	18	72.0	42	84.0
Present	1	4.0	7	28.0	8	16.0
Total	25	100.0	25	100.0	50	100.0
Chi – square = 5.35 p=0.021* (significant)						

Table 8: Distribution based on Intra-abdominal abscess [n=25]

Abscess	Early	%	Late	%	Total	%
Absent	24	96.0	17	68.0	41	82.0
Present	1	4.0	8	32.0	9	18.0
Total	25	100.0	25	100.0	50	100.0
Chi – square = 6.64 p=0.010* (significant)						

Table 9: Distribution based on GI complications [n=25]

Complications	Early	%	Late	%	Total	%
Absent	18	72.0	11	44.0	29	58.0
Present	7	28.0	14	56.0	21	42.0
Total	25	100.0	25	100.0	50	100.0
Chi – square = 4.02 p=0.045* (significant)						

Table 10: Mean duration of hospital stay

Group	Days (Mean ± SD)	p-value
Early	6.42 ± 1.9	0.001*
Late	10.9 ± 2.5	

Discussion

In the present study, the early feeding group predominantly comprised younger individuals aged 31–40 years (28%), whereas the late feeding group had a higher proportion in the 51–60 (24%) and 61–70 (20%) age range. Although the differences were not statistically significant, the observed trend suggests that initiation early feeding in younger patients, possibly due to better nutritional reserves and faster recovery potential. Similar trends were reported by Chaudhry SR, et al. [5] where younger patients tolerated early feeding better and had fewer complications. Conversely, Natarajan et al. [6] emphasized that age alone should not preclude early feeding as even elderly patients benefited equally in terms of postoperative recovery.

In terms of gender, the present study noted a male predominance in both the early and late feeding groups, with 80% and 84% of the participants being male, respectively. Female patients comprised a smaller proportion, accounting for 20% in the early feeding group and 16% in the late group. These differences were not statistically significant, indicating that gender did not influence the timing of nutritional intervention. This pattern aligns with demographic observations in other studies, such as those by Dasari et al. [7] and Behera et al. [8], which also documented a higher incidence of major abdominal surgeries among male patients. The predominance of males may reflect a higher incidence of gastrointestinal surgical conditions. Importantly, current literature does not suggest that gender significantly impacts the tolerance or clinical outcomes of early postoperative feeding.

Most of the previous studies suggested that, patients with fewer or well-controlled comorbidities are more likely to be started on early enteral nutrition, given the lower risk of complications. This trend is supported by studies such as those by Feng et al. [9] and Gianotti et al. [10], which found that patients with stable comorbid conditions and adequate preoperative nutritional status benefited most from early feeding, with improved wound healing and reduced infection rates. Conversely, in patients perceived as high-risk particularly those with delayed gastric emptying, bowel edema, or severe metabolic disturbances may be opted for delayed feeding, even though evidence-based protocols like ERAS increasingly support early nutrition even in such populations. Therefore, while comorbidities and baseline nutritional risk may influence clinical decision-making, emerging evidence suggests that early feeding can be safe and advantageous across a broad spectrum of patients, provided careful monitoring is ensured.

Type of Surgical Procedure: In the present study the most common indications for surgery were small bowel obstruction (38%) and hollow viscus perforation (30%), with a similar distribution between early and late groups. Small bowel obstruction accounted for 40% of early cases and 36% of late cases, while hollow viscus perforation was seen in 28% of early and 32% of late surgeries. Sigmoid volvulus was noted in 14% of patients overall, slightly higher in the late group (16%) compared to the early group (12%). Right hemicolectomy and gastrojejunostomy were less frequent, each accounting for 8% and 10% of total surgeries, respectively.

Paralytic Ileus: A significant reduction in paralytic ileus was observed in the early feeding group (16%) compared to the late group (60%), confirming the beneficial impact of early enteral nutrition in promoting gastrointestinal motility. This aligns with findings from Cheatham et al. [11], who noted a faster return of bowel function

and reduced ileus-related morbidity with early feeding.

Wound Infection: The early feeding group exhibited a significantly lower rate of wound infection (20%) than the late group (48%). This observation is consistent with Feng et al. [9], who reported enhanced immune competence and better wound healing in patients receiving early postoperative nutrition. Nutritional support plays a vital role in collagen synthesis, neutrophil function, and angiogenesis, all of which are essential for wound healing. By preventing malnutrition and promoting protein synthesis, early feeding reduces the risk of wound-related complications, contributing to improved surgical outcomes.

Wound Dehiscence: Wound dehiscence was significantly less frequent in the early group (12%) compared to the late group (40%). Behera et al. [8] similarly found that early feeding supported tissue repair and decreased the incidence of wound disruption. The adequate nutritional supply in the early postoperative period appears to enhance tensile strength and collagen deposition at the wound site. This finding is contrast to the traditional approach that early feeding may increase intra-abdominal pressure and risk of dehiscence, especially when it is cautiously introduced and is specified to individual tolerance.

Wound Leak: Wound leak was observed in only 4% of early feeding patients versus 28% in the late group, with the difference being statistically significant. This is consistent with Kehlet et al. [12], who demonstrated that early feeding did not increase anastomotic complications when implemented with careful patient selection. Moreover, early enteral nutrition may improve local tissue oxygenation and support mucosal integrity, reducing the chance of wound leaks. These findings suggest that the risk of leak is more dependent on surgical technique and host factors rather than timing of feeding alone.

One of the primary concerns about early feeding has been the potential risk of anastomotic leakage, particularly in bowel surgery. However, several studies reported contrasting results. Osland et al. [13] reported no significant increase in anastomotic dehiscence with early feeding (OR 0.75; 95% CI 0.39–1.4, p = 0.39)14. Khan et al. (2021) observed zero cases of leakage in the early group, compared to 10% in the late feeding group (p = 0.001), while D. R. and Pingali et al. [15] also reported no significant difference in anastomotic complications between groups. This consistency across multiple studies indicates that EEN, when introduced cautiously, does not compromise anastomotic safety and may in fact improve healing through enhanced nutritional support and reduced inflammatory response.

Intra-abdominal Abscess: The incidence of intra-abdominal abscess was significantly lower in the early group (4%) compared to the late group (32%). Similar findings were reported by Schweiger et al. [16], who found that delayed enteral nutrition increased the risk of intra-abdominal sepsis due to prolonged ileus and bacterial translocation. Early feeding helps maintain the intestinal barrier and prevents translocation of gut flora, thus lowering the risk of secondary abscess formation. This highlights the immunological and protective role of early gut stimulation.

Gastrointestinal (GI) Complications: GI complications, such as vomiting, abdominal distension, or constipation, occurred more frequently in the late group (56%) than in the early group (28%). These findings are similar to Reissman et al. [17], who concluded that early enteral feeding did not increase GI side effects and, in fact, led to quicker normalization of bowel function. Possible explanations include stimulation of peristalsis, reduced need for opioid analgesics, and prevention of gut disuse atrophy. Early feeding appears to offer both mechanical and functional advantages to the gastrointestinal tract.

While Osland et al. [13] found no statistically significant difference in time to flatus, first bowel movement, or tolerance ($p > 0.05$), the trend favored early feeding. Rehman et al. [18] added further evidence by demonstrating a faster return of gastrointestinal function in the early group, characterized by earlier bowel sounds, passage of flatus, and stool. Moreover, the tolerance to enteral feeding was generally good, with minimal instances of nausea or vomiting, and no significant increase in nasogastric tube reinsertion. These observations suggest that, while some traditional concerns regarding tolerance persist, modern clinical evidence increasingly supports the feasibility and gastrointestinal safety of early feeding when administered with careful patient selection.

Duration of Hospital Stay: The mean hospital stay was significantly shorter in the early feeding group (6.42 ± 1.9 days) compared to the late feeding group (10.9 ± 2.5 days), highlighting the economic and clinical benefits of early nutritional intervention. These results are in agreement with Gianotti et al. [10] and Bozzetti et al. [19], who found reduced postoperative stay and complications with early enteral nutrition. Shorter hospital also reduces the risk of nosocomial infections and improve patient satisfaction. Incorporating early feeding as a routine component of Enhanced Recovery After Surgery (ERAS) protocols can thus have profound implications.

Early postoperative feeding has consistently demonstrated its ability to reduce both ICU and total hospital stay, thereby offering clinical and economic advantages. Lee et al. observed a significantly shorter ICU stay (1 day vs. 2 days, p <0.05) and a reduced total hospital stay (9 days vs. 12 days, p <0.05) in patients receiving early nutrition. These results were similar those in Herbert et al. [20] meta-analysis, which reported a mean reduction of 1.95 days in hospital stay among patients receiving early enteral feeding ($p < 0.001$), though heterogeneity was high. Khan et al. [21] reported an even more substantial reduction, with hospital stay dropping from an average of 6.55 ± 2.93 days in the late group to 2.62 ± 0.71 days in the early group ($p = 0.001$). Similarly, D. R. Pingali et al [15] found statistically significant shorter hospital stays in early-fed patients ($p = 0.009$). These findings highlight the role of EEN in accelerating recovery, reducing nosocomial risks, and alleviating the healthcare burden.

Several recent studies have indicated the beneficial role of early postoperative enteral nutrition (EEN) in minimizing overall postoperative complications following major gastrointestinal surgeries. A meta-analysis by Osland et al. [13] which included 15 studies with 1,240 patients, found a significant 45% reduction in the relative odds of total postoperative complications in patients receiving EEN (OR 0.55; 95% CI 0.35–0.87, $p = 0.01$). Similarly, Chakravarthi et al. [22] demonstrated a markedly lower incidence of postoperative complications such as pulmonary infections, wound infection, and paralytic ileus in the early feeding group compared to those receiving delayed nutrition The findings were also supported by Khan et al. [21] who reported a significantly lower rate of wound infections (8% vs. 33%) and zero cases of anastomotic leakage in the early feeding group versus a 10% leakage rate in the late group (p <0.05). These consistent findings emphasize the safety and protective role of early feeding in postoperative recovery by reducing systemic inflammatory response, supporting immune function, and enhancing tissue repair.

Rehman et al. [18] corroborated these results, noting fewer pulmonary infections and febrile episodes in early-fed patients. These findings indicate that EEN may contribute not only to nutritional replenishment but also to enhanced pulmonary outcomes through faster systemic recovery. Across the several studies, no significant differences in mortality were observed between early and late feeding groups. Osland et al. [13], Herbert et al. [20], and Rehman et al. [18] all reported comparable mortality rates regardless of feeding timing. Adverse events such as nausea, vomiting, or ileus were similarly distributed across groups, with no consistent evidence suggesting increased risks with early enteral nutrition. This highlights the safety profile of EEN in various postoperative contexts and emphasizes the importance of individualized care based on clinical parameters rather than rigid protocols.

Conclusion

Early postoperative enteral nutrition, initiated within 24–48 hours following major gastrointestinal surgeries, has emerged as a safe and effective strategy that offers multiple clinical benefits without increasing the risk of adverse outcomes. Across many studies, early feeding has consistently demonstrated reductions in total postoperative complications, wound infections, pulmonary complications, and hospital stay duration. While concerns such as anastomotic leakage and feeding intolerance were significant issues, current evidence shows no significant increase in these risks when early feeding is carefully implemented in hemodynamically stable patients. Additionally, early feeding supports faster return of gastrointestinal function, improved nutritional recovery, and enhanced overall postoperative outcomes. These findings collectively support the integration of early enteral nutrition into standard postoperative care, particularly as part of enhanced recovery protocols, emphasizing its role in promoting recovery, reducing morbidity, and optimizing resource utilization in surgical patients.

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