

Original Research Article

Early enteral feeding in patients with gastrointestinal surgery time to send the patient home early

Deepak Kumar Soni*, Shrikant Sharma, Shehtaj Khan

Department of General Surgery, L. N. Medical College, Bhopal, Madhya Pradesh, India

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***Correspondence:**

Dr. Deepak Kumar Soni,

E-mail: dil.deepaksoni@gmail.com

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ABSTRACT

Background: There has been a trend among surgeons to delay enteral feeding following gastrointestinal surgery so that complications like anastomotic site leak and infection can be prevented and also to give time for operated site to heal. Newer studies suggest that early enteral feeding is useful in comparison to conventional method of feeding i.e. waiting for bowel function to return. This study was undertaken to evaluate the safety and tolerability of early enteral feeding after gastrointestinal surgeries in terms of postoperative complications and length of hospitalization.

Methods: This study was prospective observational study with retrospective controls done over a period of 18 months at a tertiary care center in India. 35 patients were included in each group (case versus control). Early enteral feeding was defined as commencement of oral feed within 48 hours of surgery. The data was analyzed using statistical package of social science (SPSS Version 20; Chicago Inc., USA).

Results: Both groups were found to be well matched in terms of age and sex distribution. The mean hospital stay for patients given early enteral feeding was significantly lower as compared to controls (10.26±3.09 versus 13.4±2.186). They had a complication rate of 11.4 % as compared to late enteral feeding group (25.7%).

Conclusions: Early enteral feeding has been found beneficial in most of the studies worldwide. Hence, it is time to open our minds and embrace it to improve surgical outcome in gastrointestinal surgery practice.

Keywords: Early enteral feedings, Conventional method feeding, Anastomotic site leak, Infection

INTRODUCTION

There has been a trend among surgeon to delay enteral feeding following gastrointestinal surgery so that complications like operated site leak, infection and abscess can be prevented and also to give time for operated site to heal. However saliva, digestive juices and intestinal juices if they pass through the anastomotic site without leak, there is no need to delay feeding for fear of leak.¹

Studies suggest that early enteral feeding is useful in comparison to conventional method of feeding i.e. waiting for bowel function to return. It has been seen post

operative dysmotility predominantly affects the stomach and colon with motility in small bowel being normal within 4 to 8 hours after intestinal surgery. The presence of peristalsis and absorption of food further reinforce the actual fact that enteral feeding is well tolerated resulting in rapid wound healing and shorter duration of hospital stay.^{2,3}

It has been established that there is lack of clear rationale for delaying oral intake after colorectal surgery and there are it potential benefits from early enteral feeding.^{4,6}

Conventionally the stomach is decompressed with a nasogastric tube and parenteral fluids are given and oral

feeding started after return of bowel movement. As ileus may be a common phenomenon after abdominal surgery.⁷

Many studies have proved that the routine use of a nasogastric tube after abdominal surgery and colorectal surgery might not be necessary. Studies were done to evaluate whether early enteral feeding after different abdominal surgeries and multisystem trauma could offer diminish stress response, improve immunity, wound healing and significantly decrease septic complications. This presumably occurs by stimulating enterocyte growth, leading to improved mucosal barrier function and decreased bacterial translocation. Motility studies that document return of small bowel peristalsis within hours after laparotomy provide the theoretical support for early postoperative feeding.⁸

It is known that the stomach and pancreas secrete 1-2 liters of fluid daily, which is quickly absorbed within the gut.⁹ therefore, patients without a ryle's tube in postoperative period can tolerate high volumes of fluid. In addition, starvation changes the body's metabolism within 24 hours by increasing insulin resistance and reducing muscle function. Several studies suggested that after surgery, optimal nutritional status and maintenance of bowel function contribute significantly to wound healing. Early oral intake has also been suggested to scale back sepsis risk due to decreased bacterial colonization and decreased translocation through defects on the bowel mucosa into the blood circulation. Supported these findings, the concept of withholding oral intake postoperatively doesn't seem to be reasonable.¹⁰

The aim of this clinical study is to evaluate the safety and tolerability of early enteral feeding after gastrointestinal surgeries in terms of postoperative complications, and also the length of hospitalization.

METHODS

Study design

This was a prospective observational study with retrospective control taken from records, conducted in JK hospital undergoing gastrointestinal surgery from May 2019 to October 2020.

Sample size

The sample size was 70.

Inclusion criteria

Patients who underwent gastrointestinal surgery during study period.

Exclusion criteria

Appendectomy and cholecystectomy. Patients did not give consent for inclusion in the study.

Methodology

A total of 35 patients were included in early enteral feeding group prospectively and data of 35 patients (conventional methods of feeding) was taken from records. Early enteral feeding was defined as commencement of liquid sips or liquid diet per oral within 48 hrs post surgeries and if tolerated, then the patient was encouraged to continue with the same diet. If any complications were seen like vomiting or abdominal distension then the feeding was discontinued and the appropriate intervention was done.

Conventional method of feeding- defined as commencement of liquid sips or liquid diet per oral after reappearance of bowel sound, passing of flatus and motion.

Statistical analysis

All the data was entered in Microsoft excel sheet and analyzed using statistical package of social science (SPSS Version 20; Chicago Inc., USA) and $p < 0.05$ was taken as significance.

RESULTS

There were 44 patients who were underwent gastrointestinal surgery at JK hospital but only 35 patients were included in study after applying the exclusion criteria. Retrospective data of 35 patients was taken from records (control group).

Table 1: Distribution of patients by demographic variables (age group and sex).

Age group	Male		Female	
Mean age	37.37		36.42	
	n	%	n	%
0 to 19	3	75	1	25
20 to 39	27	71.1	11	28.9
40 to 59	19	76.0	6	24.0
60 and above	2	66.7	1	33.3
Total	51	72.9	19	27.1

Overall the mean age of the participants was found to be 37.11 (± 12.25) years with most of the patients falling in the age group 20 to 39 years ($n=38$, 54.3%). The age of the participants ranged from 1 to 69 years. Median age was 35 years and mode was 45 years. Majority of the participants were males ($n=51$, 72.9%). The Male: Female ratio was 2.69:1. The mean age for male and female participants was 37.37 years and 36.42 years respectively. ($p < 0.05$) (Table 1)

The two groups were found to be age matched ($p < 0.05$) (Table 2).

Table 2: Age group comparisons (Early enteral feeding vs Conventional method of feeding).

Attribute	Early enteral feeding group (n=35)	Conventional method of feeding group (n=35)
Mean Age (years)	38.09	36.14
Age group (in years)	N (%)	N (%)
0 to 19	3 (8.6)	1 (2.9)
20 to 39	15 (42.9)	23 (65.7)
40 to 59	14 (40)	11 (31.4)
60 and above	3 (8.6)	0 (0)
Total	35 (100)	35 (100)

Table 3: Distribution of participants in type of surgery.

Type of Surgery	Overall N (%)	Early enteral feeding group (n=35)		Conventional method of feeding group (n=35)	
		N	%	N	%
Emergency	28 (40)	17	48.6	11	31.4
Routine	42 (60)	18	51.4	24	68.6
Total	70 (100)	35	100	35	100

Around two-thirds of the participants were operated as routine surgery (n=42, 60%) and the rest (n=28, 40%) were operated as emergency surgery. However, between the two study groups this difference was found to be statistically insignificant. (p<0.05) (Table 3).

The distribution of diagnosis was similar across the two groups early enteral feeding versus conventional method of feeding (p value – 0.351) (Table 4).

Outcome comparisons in the two groups

The overall complication rate was 18.57% (n= 13 out of 70). Only 4 out of the 35 participants in the early enteral feeding group had a complication (11.4%) as compared to the 9 out of 35 in the conventional method of feeding group (25.7%), the Pearson chi-square value was 0.21 and hence this difference was found to be statistically insignificant. In early enteral feeding group, three patients had the complication of wound infection and one patient had anastomotic leak. In the conventional feeding group, the most common complication observed was wound infection and it was noted in six patients, two patients had pulmonary complication while anastomotic leak was observed in one patient (Table 5).

Table 4: Intervention group comparison for indication of surgery.

Diagnosis	Early enteral feeding		Conventional method of feeding	
	N	%	N	%
Intestinal Perforation	16	45.70	12	34.30
CA Colon	3	8.60	7	20.00
Elective Ileostomy closure	3	8.60	3	8.60
Koch's Abdomen	3	8.60	8	22.90
Elective Colostomy closure	2	5.70	3	8.60
Gastric outlet obstruction	2	5.70	1	2.90
Diverticula	2	5.70	0	0.00
Intestinal adhesion Obstruction	1	2.90	1	2.90
Ileal Stricture	1	2.90	0	0.00
Pancreatic calculus	1	2.90	0	0.00
Colo- cutaneous fistula	1	2.90	0	0.00
Total	35	100	35	100

Table 5: Comparison of the complication rate of both groups.

Complication	Early Enteral feeding Group	Conventional method feeding Group	P value
Wound infection	3	6	0.687
Pulmonary complication	0	2	0.322
Anastomotic leak	1	1	1
Death	0	0	1
Total	4 (11.4%)	9 (25.7)	0.21

The mean hospital stay for patients given early enteral feeding was lower 10.26 (±3.090) days as compared to those who were given conventional feeding 13.40 (±2.186) days. (P<0.05) hence the difference was statistically significant (Table 6).

DISCUSSION

In this study, 35 patients were included in early enteral feeding group prospectively and data of 35 patients were taken as control (conventional methods of feeding) from the records. The mean age of participants in the study group and control was 38.09 years verses 36.14 years

respectively. This difference was found to be statistically insignificant ($p>0.05$).

Table 6: Mean hospital stay (days) in Early enteral feeding group and Conventional method of feeding group.

	Mean	Standard deviation	P value
Early enteral feeding group (n=35)	10.26	3.090	0.028
Conventional method of feeding group (n=35)	13.40	2.186	

Various studies in the past like Marwah et al in 2007 (mean age of 29.92 years in early group and 38 years in late group), Sundar et al in 2014 (mean age was 26.27 years in early group and 30.8 years in late group ($p=0.537$), Bajwa et al in 2017 (mean age of patients in early enteral and late group was 38.1 ± 12.104 and 36.13 ± 13.15 years respectively) found similar results as in our study.^{11,14,15}

Chatterjee et al in 2012 (mean age was 38.18 years in early group and 36.23 years in late group), Ahmad et al in 2013 (mean age for early enteral feeding was 42 ± 13 years and for late enteral feeding was 44 ± 15 year), Dorai et al in 2016 (mean age was 44.20 years in early enteral feeding and 51.07 years in conventional method of feeding group), all these above studies also shows statistically insignificant results. Whereas Thapa et al in 2011 found much higher mean age which was 50.9 ± 18.44 years in early and 47.3 ± 16.75 year ($p=0.516$) in late enteral feeding groups. This was due to surgery for carcinoma which is a late age disease itself and this difference was statistically insignificant.^{12,13,16,19}

Sex distribution

In our study, as with the overall sex distribution, each age group had a male participants preponderance, but this difference was found to be statistically insignificant ($p=0.968$). The mean age for male and female participants was 37.37 years and 36.42 years respectively.

In our study, the early enteral feeding group males and females were 77.1% and 22.9% respectively. For conventional feeding group, males and females were 68.6% and 31.4% respectively. This difference was statistically insignificant (p value – 0.592). These findings were comparable to various studies like Marwah et al in 2007 (males were 64% in early and 80% in late group), Chatterjee et al in 2012 (70% males in early group and 76.67% males in late group). Our study and all other similar studies had a male participant's preponderance in each groups and the differences was statistically insignificant.^{11,12}

Type of surgery

In our study around two-thirds of the participants were operated as routine surgery ($n=42$, 60%) and the rest ($n=28$, 40%) were operated as emergency surgery.

A majority of female participants underwent routine surgery ($n=18$, 94.7%) whereas almost the similar number of males underwent emergency surgery (52.9% versus 47.1% respectively). This difference between both males and females was found to be statistically significant (p value–0.000).

Out of those who were in the early enteral feeding group, 48.6% ($n=17$) underwent emergency surgery and the rest, 51.4% ($n=18$) went for routine surgery. For the late enteral feeding group, it was 31.4% and 68.6% respectively. However, this difference was found to be statistically insignificant. ($p=0.222$)

Indications of operation and operative procedures

In our study diagnoses distribution was similar in early and late feeding group. Most common was perforation peritonitis (45.70% in early and 34.30% in late group) followed by closure of stoma (Ileostomy/colostomy) (14.3%) created for gut perforation or obstruction distal to stoma and Kochs abdomen in the conventional method. Most common cause of operation in Lee et al 2011 was bowel perforation, in Marwah et al in 2007 and in S. Chatterjee et al in 2012 was closure of stoma, in Hyung et al in 2014 was bowel perforation.^{11,12,18}

Average hospital stay

The mean hospital stay in emergency surgery was 9.3 ± 2.56 days in early feeding group and 12.2 ± 0.98 days in conventional method of feeding group. The mean hospital stay in routine surgery was 11.2 ± 3.33 days in early feeding group and 14.0 ± 2.36 days in the conventional method group.

For patients given early enteral feeding, the mean hospital stay for patients was 10.26 (± 3.090) days lower as compared to those who were given conventional feeding, where it was observed to be 13.40 (± 2.186) days. This amounted to a mean difference of -3.143 with a p value of 0.028 hence the difference was highly statistically significant.

The mean postoperative hospital stay in Bajwa et al in 2017 found that was 7.4 days ($SD=4.966$) in early and 10.133 days ($SD=5.09$) in the late group, while in Thapa et al study in 2011 there was post-operative hospital stay of 5.5 ± 0.58 days in early enteral feeding group and 9.5 ± 2.89 days in the late enteral feeding group, which was statistically significant as compared to our study.^{15,16}

Postoperative complications

Total complication rate was 18.5% (13 out of 70). 4 out of 35 (11.4%) in early group (3 wound infection, one anastomotic leak) and 9 out of 35 (25.7%) in late group (6 wound infection cases, 2 pulmonary complication, and one anastomotic leak) was observed. Kishore et al in 2014 found 4 out of 37 in early (2 pulmonary complication, one leak, one abdominal distension) and 7 out of 37 in late group (3 anastomotic leak, 3 pulmonary complication and one abdominal distension).¹⁸

Surgical wound infection

In surgical wound infection, the key goals are the use of good surgical technique to avoid tissue trauma. Other known risk factors for development of wound infections include advanced age, obesity, diabetes mellitus, smoking, malnutrition, altered immune response, and preoperative hospitalization presence of infection at remote body site, length of operation and use of surgical drains.

In our study, the incidence of wound infection was seen in 3 cases in early enteral group, while in conventional group it was seen in six patients.

It was suggested that early enteral nutrition leads to decrease in wound infection.

A Meta-analysis published by Stephen et al in 2001 observed reduction of wound infection in early feeding group. Lee et al in 2011, Sunder et al in 2014 and Chatterjee et al in 2012 also observed lesser number of wound infection cases in early group but failed to reach the significance ($p > 0.05$).^{1,12,14,18}

Anastomotic leak

In our study, 2 anastomotic leak cases were observed. One case of leak belonged to ileostomy closure (in early enteral feeding group) and the other one was after resection anastomosis of ileum (in conventional method of feeding).

All the cases undergone re-laparotomy and ileostomy was created. On exploration we found that anastomotic leak is because of faulty technique in both groups. And no statistical significance was found amongst early and late feeding groups in our study.

In Bajwa et al in 2017 study, rate of anastomotic site leak was 13.33% in early group and 6.67% in late group which was almost equal.¹⁵ Thapa et al in 2011 also observed that out of 20 patients in early group anastomotic site leak was seen in one case while in 2 cases in late group but cause of anastomotic leak is not known.¹⁶

Pulmonary complications

In our study the pulmonary complications were not seen in early enteral feeding groups while in conventional feeding group, it was seen in 2 patients (p value is 0.1548 i.e. insignificant). Pulmonary complication prolonged length of stay in conventional feeding group suggesting that early feeding resulted in better fluid balance. Pulmonary complication was seen in conventional feeding because they kept the nasogastric tube for longer period which was a risk factor for aspiration pneumonia. Many studies suggested that pulmonary complication is associated with prolong use of nasogastric tube because of aspiration pneumonia.

In 2001, the meta-analysis conducted by Lewis et al the incidence of pneumonia and abdominal abscess was less in early feeding group but results were not significant statistically ($p = 0.85$ and 0.84 respectively).¹

In 1992, Moore et al showed a meta-analysis of high-risk surgical patients. It was noted that early feeding was associated with a lower incidence of pneumonia and other septic complications.²⁰

Limitations

This study was a small study and control were taken from past i.e. from hospital records and cases were taken prospectively. So, for more significant results a larger study is warranted in which cases and controls both are taken prospectively and observation should be done on maximum no. of patients.

CONCLUSION

Following conclusion can be drawn from the study: The mean hospital stay for patients given early enteral feeding was lower as compared to those who were given conventional feeding. The overall complication rate was 18.5% ($n = 13$ out of 70). Only 4 out of the 35 participants in the early enteral feeding group had a complication (11.4%) as compared to the 9 out of 35 participants in the late enteral feeding group (25.7%), the Pearson chi-square value was 0.21 and hence this difference was found to be statistically insignificant. Hence, no major complication difference was seen in both groups. So early enteral feeding has been found beneficial in most of the studies worldwide. It is validated from time and again by various researchers. Hence, it is time to open our minds and embrace it to improve surgical outcome in gastrointestinal surgery practice.

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