Original Research Article

Effects of early enteral nutrition on patients after emergency and elective gastro-intestinal surgery

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Abstract

Background: After gastrointestinal surgery like anastomosis, patients are usually not allowed to take feed orally for five days. This is to prevent post operative nausea and vomiting and also to protect the anastomotic site allowing it to heal.
Aim: This randomized control study sought to compare the outcome of early Enteral feeding versus delayed feeding after gastrointestinal surgery.
Materials and methods: 60 patients were randomly selected and classified into two groups, early feeding group and late feeding group and following were noted; anastomotic leak, infection (wound, intra-abdominal abscess, pulmonary complication, sepsis), length of hospital stay.
Results: The mean length of hospital stay was 9.3 vs 10.90. The difference was 1.6 days (P value: 0.129). Wound infection was 20% vs 26.7%. 6.7% had intra-abdominal abscess in the early feeding group which was statistically insignificant. There were two patients (6.7%) with sepsis in late feeding group (p= 0.150). There were no anastomotic leak and no deaths in the both the groups.
Conclusion: The present study indicated that there was no significant difference between the two groups. Late feeding doesn't confer any significant advantage. There was no advantage of dietary restriction. Hence we recommend that early post-operative feeding is safer.

Key words

Early feeding, nutrition, Length of hospital stay, Anastomotic leak.

Introduction

Traditionally enteral feeding after anastomosis has been delayed to prevent the development of complications. Rationale for this is to prevent post operative nausea and vomiting and also to protect the anastomotic site to allow time to heal. However gastric juice, intestine secretions pass across the anastomotic site. If this can pass without leak, there is no rationale for delaying oral feeds for fear of leak [1-4]. Various studies suggest that early enteral feeding is beneficial in comparison to delayed feeding. Physiological studies show that post-operative dysmotility predominantly affects the stomach and colon with motility in small intestine being normal within 4 to 8 hours after intestinal surgery. The physiological studies demonstrating the presence of peristalsis and absorption of food further reinforce the fact that early feeding is well tolerated leading to rapid wound healing and shorter duration of hospital stay [4-7].

Several studies demonstrate that after surgery nutritional status and maintenance of bowel function contribute significantly to wound healing. Based on these findings the concept of withholding oral feed does not seem to be reasonable. Because of lack of clear rationale for delaying oral intake after colorectal surgery is lacking and there are potential benefits from early feeding we planned a randomised controlled study [8-14].

In this study, we have taken up both elective and emergency gastrointestinal surgery for study.

Materials and methods

Study population

The study was conducted among all eligible patients scheduled for gastrointestinal surgery at Govt. Stanley Medical College and Hospital who satisfied the inclusion criteria.

Study design

Randomized control trial. Randomization based on computer generated numbers.

Sample size: 60 Cases

- In 30 cases, enteral feeding was started within 48 hours.
- In 30 cases, enteral feeding was delayed for more than 48 hours.

Variables to evaluate

- Dependent variable
  - Anastomotic leak
  - Infection (wound infection, Intra abdominal abscess, Pulmonary complication, Sepsis)
  - Length of hospital stay
- Independent variable
  - Age and sex

Participant recruitment

Inclusion criteria

- Patients who undergone bowel resection and/or anastomosis or primary repair with traumatic or non-traumatic intestinal perforation.
- Patients who had intestinal obstruction including strangulation.

Exclusion criteria

- Patients who underwent appendectomy, cholecystectomy, or adhesiolysis without bowel resection and/or anastomosis were excluded,
- Sustained bowel ischemia
- Short bowel syndrome
- Patients managed in the intensive care unit (ICU) for more than 3 days

Sampling method

All eligible patients were recruited into the study. Patients scheduled for elective or emergency small intestinal anastamosis were subjected to randomization based on computer generated numbers. Using the numbers generated the patients were assigned into two groups (early and late).

Patients were recruited at casualty and general surgical wards who meet the inclusion criteria. Consent for participation in the study was obtained from the patients after pre-consent counseling. The consent for participation in the

study was obtained simultaneously with the consent for surgery.

Operating surgeons were sensitized and recruited into the study before the operations. The sensitization of surgeons had been on-going since the time of presentation in the department of surgery in early January. Before the study commenced, there were sensitization CMEs (continual medical education) at the end of the major rounds in all the general surgical wards. Circulars were also used in the general surgical wards, casualty and theatres.

Intestinal resection and anastomosis was done as per surgeon's technique (double or single layer of anastomosis). The site of operation and the intra-operative findings were be noted by the operating surgeon.

Patients were allocated to an early group (E) or a late group (L) according to time of feeding commencement. Early feeding was defined as commencement of a liquid or soft diet via a tube or per os within 48 hours after surgery.

In the early group (E) sips of water will be started within 48 hours of surgery and increased to 30 ml/hour. This was continued for 6 hours and if tolerated the patient was encouraged to proceed to liquid diet and subsequently to light diet. Episodes of abdominal distension and vomiting were reported. The patients who were noted to be vomiting (bilious) more than twice or having progressive abdominal distension were stopped from feeding.

In the late group (L) the initiation of feeds commenced upon resumption of bowel sounds either after clinical assessment or passage of stool or flatus. The patient was then started on oral sips, liquid diet, light diet and then normal diet. Liquid diet in both arms was milk, soup or tea. The following were noted; anastomotic leak, infection (wound, intra-abdominal abscess), length of hospital stay.

Wound infection was assessed based on the CDC criteria for surgical site infection, swab for culture and sensitivity in presence of wound discharge.

Anastomotic leak was diagnosed based on discharge of intestinal contents from incision or drain site, localized or generalized peritonitis, fever or radiologically using CT scan with water soluble enteric contrast.

Intra-abdominal abscess was diagnosed on the basis of an abdominal ultrasound. The indication for surgery, site of anastamosis, signs of infection: temperature, pulse rate and leukocytosis were recorded.

Post-operative follow up was for 30 days. The day the patient was discharged by the attending surgeon was used for calculating the duration of hospital stay. The patients were seen at intervals of two weeks from the date of discharge. Patients who needed reoperation for intestinal obstruction, intra-abdominal abscess or anastomotic leak with distal obstruction were operated by the primary surgeon or any surgeon handling the ward emergencies at that particular time.

Data handling

Data was collected by the principal investigator using pre-designed data collection sheets and cleaning was done before analysis. Data was entered into Microsoft Excel©. Data was then exported to SPSS 16.0 version for analysis. The analysis for the various outcomes and comparisons between the two arms of the study was performed using the intent-to-treat (ITT) analysis. Frequency tables and summary statistics were made for the socio-demographic characteristics and the various outcome variables in the two arms of the study. Means, medians were calculated and compared between the two arms of the study To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean and S.D. were used for continuous variables. To find the significant

difference between the bivariate samples in Independent groups (Hospital stay - Early and Late) unpaired sample t-test was used. To find the significance in categorical data Chi-Square test was used. In all the above statistical tools the probability value .05 was considered as significant level.

Ethical considerations

The study commenced upon approval by the Department of Surgery and Institutional Ethical Committee (IEC). Informed consent was obtained from each participant prior to enrolment in the study. A pre-consent counselling of the participants was done .The next of kin signed consent on behalf of participants who were unable to do so. Those who declined participation were not denied treatment they deserved because of their decision not to participate. There was no extra cost incurred for participating in the study.

Results

The mean age in the early feeding group was 44.20 and in late group (L) was 51.07 years (**Table – 1**). Comparison of gender between early and late was as per **Table – 2**. Cause of surgery in early group was as per **Table – 3**. Cause of surgery in late group was as per **Table – 4**. Comparison of site of surgery between early and late group was as per **Table – 5**. Comparison of type of surgery between early and late group was as per **Table – 6**. Comparison of pulmonary complication between early and late group was as per **Table – 7**. Comparison of wound infection between early and later group was as per **Table – 8**. Comparison of sepsis between early and late group was as per **Table – 9**. Comparison of intra abdominal abscess between early and late group was as per **Table – 10**.

Complication rate

Six patients (20%) had wound infection in the early feeding group compared to eight (26.7%) in the delayed feeding group. Two patients (6.7%) had intra-abdominal abscess in the early feeding group and none in the delayed feeding arm of the study which is statistically insignificant. There was two patients (6.7%) with sepsis in late feeding group p= 0.150. there were no anastomotic leak and no deaths in the both the groups (**Table – 11**).

Length of hospital stay

The mean length of hospital stay was shorter in the early feeding group 9·3 days while the late feeding patients had a mean hospital stay of 10.90 days. The difference was 1.6 days (P value: 0.129) as per **Table – 12**.

Table - 1: T-TEST comparing mean age of participants.

Groups		N	Mean	Std. Deviation	Std. Error Mean
Age	**Early**	30	44.20	12.254	2.237
	Late	30	51.07	15.102	2.757

Discussion

After intestinal anastomosis the practice has been to delay feeding until there is clinical evidence of bowel movement. Studies have shown that early enteral feeding has better outcome in terms of shorter duration of hospital stay and lower rates of complication which translates into reduced cost of treatment [15-22]. In spite of the documented evidence the practice of delayed feeding after anastomosis is still the norm rather than the exception in GSH. Adequate nutrition in the postoperative period is a major goal that is never achieved when feeding is delayed after anastomosis. Early feeding reduces the incidence of infections, improves wound healing and anastomotic strength [23-33].

In this study, subjects were those undergoing both elective and emergency surgery. It includes all sites of GI surgery from stomach, small intestine and large intestine. Type of GI surgery was either anastomosis or primary closure.

Table – 2: Comparing gender between early and late.

			Group		Total
			Early	Late	
Gender	**F**	**Count**	9	10	19
		% within EL	30.0%	33.3%	31.7%
	M	**Count**	21	20	41
		% within EL	70.0%	66.7%	68.3%
Total		**Count**	30	30	60
		% within EL	100.0%	100.0%	100.0%

Table – 3: Cause of surgery in early group.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Blunt injury abdomen	1	3.3	3.3	3.3
	Ca cecum	1	3.3	3.3	6.7
	Ca colon	1	3.3	3.3	10.0
	Ca pancreas	4	13.3	13.3	23.3
	Ca rectum	1	3.3	3.3	26.7
	Ca stomach	4	13.3	13.3	40.0
	Calcific pancreatitis	2	6.7	6.7	46.7
	CBD stricture	2	6.7	6.7	53.3
	Diversion colostomy	1	3.3	3.3	56.7
	Diverticulosis	1	3.3	3.3	60.0
	Duodenal perforation	2	6.7	6.7	66.7
	Gastric outlet obstruction	1	3.3	3.3	70.0
	Ileal perforation	2	6.7	6.7	76.7
	Obstructed incisional hernia	1	3.3	3.3	80.0
	Obstructed inguinal hernia	1	3.3	3.3	83.3
	Obstruction	1	3.3	3.3	86.7
	Periampullary Ca	1	3.3	3.3	90.0
	Post ileostomy status	1	3.3	3.3	93.3
	Pseudocyst of pancreas	1	3.3	3.3	96.7
	Stab injury abdomen	1	3.3	3.3	100.0
	Total	30	100.0	100.0	

After gastrointestinal surgery the patients in the early Enteral feeding group were given sips of water within 48 hours of surgery, while the delayed group were initiated on feeds after auscultation of bowel sounds or passage of flatus. The mean age in the early feeding group is 44.20 and in late group (L) is 51.07. The difference in age of the patients between the two groups was not statistically significant (P=0·06).In respect to gender there was no significant difference in the male to female ratio between the two groups p=0·781. In the early feeding group the 21 (70%) were male and the female were 9(30%). In the delayed feeding 20 (66.7%) were male while the female were 10 (33.3%).

Complication rate

Six patients (20%) had wound infection in the early feeding group compared to eight (26.7%) in

the delayed feeding group. Two patients (6.7%) had intra-abdominal abscess in the early feeding group and none in the delayed feeding arm of the study which is statistically insignificant. There was two patients (6.7%) with sepsis in late feeding group p= 0.150. There were no anastomotic leak and no deaths in the both the groups.

Table – 4: Cause of surgery in late group.

Cause of surgery		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ca caecum	1	3.3	3.3	3.3
	Ca pancreas	4	13.3	13.3	16.7
	Ca stomach	8	26.7	26.7	43.3
	Chronic calcific pancreatitis	1	3.3	3.3	46.7
	Diversion colostomy	1	3.3	3.3	50.0
	Duodenal perforation	2	6.7	6.7	56.7
	Gastric outlet obstruction	2	6.7	6.7	63.3
	Gastric perforation	1	3.3	3.3	66.7
	Ileal perforation	1	3.3	3.3	70.0
	Obstructed inguinal hernia	3	10.0	10.0	80.0
	Periampullary Ca	1	3.3	3.3	83.3
	Post ileostomy status	1	3.3	3.3	86.7
	Sigmoid volvulus	1	3.3	3.3	90.0
	Sigmoidostomy	1	3.3	3.3	93.3
	Stab injury abdomen	1	3.3	3.3	96.7
	Traumatic jejunal perforation	1	3.3	3.3	100.0
	Total	30	100.0	100.0	

Table – 5: Comparing site of surgery between early and late group.

			Group		Total
			Early	Late	
Site of surgery	Large intestine	Count	5	6	11
		% within EL	16.7%	20.0%	18.3%
	Small intestine	Count	13	13	26
		% within EL	43.3%	43.3%	43.3%
	Stomach	Count	12	11	23
		% within EL	40.0%	36.7%	38.3%
Total		Count	30	30	60
		% within EL	100.0%	100.0%	100.0%

Conclusion

This study shows there was no significant difference existed between restricted and early post operative feed. There was no advantage of dietary restriction. An adequately powered study is necessary to demonstrate a statistically significant difference in the rate of anastomotic leak and infection. The practice of early enteral feeding should be adopted to reduce the treatment cost and lower the complication rate.

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Table – 6: Comparing type of surgery between early and late group.

			Group		Total
			Early	Late	
Type of surgery	**Anastomosis**	**Count**	26	25	51
		% within EL	86.6%	83.3.0%	85%
	Primary closure	**Count**	4	5	9
		% within EL	13.3%	16.6%	15%
Total		**Count**	30	30	60
		% within EL	100.0%	100.0%	100.0%

Table – 7: Comparing pulmonary complication between early and late group.

			EL		Total
			Early	Late	
Pulmonary	**Nil**	**Count**	29	29	58
		% within EL	96.7%	96.7%	96.7%
	Yes	**Count**	1	1	2
		% within EL	3.3%	3.3%	3.3%
Total		**Count**	30	30	60
		% within EL	100.0%	100.0%	100.0%

Table – 8: Comparing wound infection between early and later group.

			EL		Total
			Early	Late	
Wound	**Nil**	**Count**	24	22	46
		% within EL	80.0%	73.3%	76.7%
	Yes	**Count**	6	8	14
		% within EL	20.0%	26.7%	23.3%
Total		**Count**	30	30	60
		% within EL	100.0%	100.0%	100.0%

Table – 9: Comparing sepsis between early and late group.

			EL		Total
			Early	Late	
Sepsis	**Nil**	**Count**	30	28	58
		% within EL	100.0%	93.3%	96.7%
	Yes	**Count**	0	2	2
		% within EL	0.0%	6.7%	3.3%
Total		**Count**	30	30	60
		% within EL	100.0%	100.0%	100.0%

Table – 10: Comparing intra abdominal abscess between early and late group.

			EL		Total
			Early	Late	
Abscess	**Nil**	**Count**	28	30	58
		% within EL	93.3%	100.0%	96.7%
	Yes	**Count**	2	0	2
		% within EL	6.7%	0.0%	3.3%
Total		**Count**	30	30	60
		% within EL	100.0%	100.0%	100.0%

Table - 11: A comparison of the complication rates between the two groups.

Complication	Early feeding	Delayed feeding	P value
Wound infection	6 (20%)	8(26.7%)	P=0·542
Intra-abdominal abscess	2 (6.7 %)	0	P=0·150
Pulmonary complication	1 (3.3%)	1 (3.3%)	P= 1.000
Sepsis	0	2 (6.7 %)	P=0·150
Anastomotic leak	0	0	
Death	0	0	

Table – 12: A comparison of length of hospital stay between the two groups.

T-Test

Group Statistics					
EL		N	Mean	Std. Deviation	Std. Error Mean
Duration of stay	Early	30	9.30	3.687	.673
	Late	30	10.90	4.334	.791

Independent Samples Test										
		Levine's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Duration of stay	Equal variances assumed	2.052	.157	-1.540	58	.129	-1.600	1.039	-3.680	.480
	Equal variances not assumed			-1.540	56.549	.129	-1.600	1.039	-3.681	.481