Early enteral nutrition following gastrointestinal anastomosis

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Citation

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Abstract

Objective :- to compare feasibility, safety and efficacy of early Vs delayed oral feeding after elective intestinal anastomosis.

Methods :- A –three –year comparative single –centre study in which 25 patients who had early feeding within 6 hrs after surgery were compared with 25 patients who had late feeding after appearance of bowel sounds and flatus passage. Patients were matched for age, sex, indication of surgery and nutritional status. Analysis was done using student's t-test regarding timing of appearance of bowel sounds, passage of flatus and stool, wound sepsis, anastomotic leaks and duration of hospital stay etc.

Results :- Mean time for appearance of bowel sounds was 1.08 ± 0.27 days in study group compared to 2.12 ± 0.6 days in control group ($p<0.05$). The mean time for passage of flatus in study and control group was 1.32 ± 0.55 Vs 2.76 ± 0.87 days ($p<0.05$) and passage of stool 2.28 ± 0.89 Vs 3.92 ± 0.90 days ($p<0.05$). Post operative serum proteins level of study group were significantly higher in comparison to control group ($p<0.05$). Three patients (12%) in control and two patients(8%) in study group had anastomosis leak. The mean hospital stay was 5.8 ± 3.09 days in study group and 10.56 ± 7.01 days in control group ($p<0.05$).

Conclusion :- Early oral feeding after elective gastro-intestinal anastomosis is well tolerated, helps in early resolution of ileus, decreased wound infection and short hospital stay.

INTRODUCTION

Routines in surgery have evolved as a way of eliminating as many variables as possible in effecting safe outcomes. One such routine practiced for last 50 years has been postoperative nasogastric decompression.However, many prospective randomized trials performed in recent years evaluating the effects of nasogastric intubation have suggested that it may be unnecessary, itself delaying passage of flatus and bowel movements as well as lengthening the duration of hospital stay [1] . There has been genuine and great apprehension regarding increased chances of anastomotic leaks in non intubated patients. However various studies have shown that the incidence of anastomotic leak is equal in both the intubated and non-intubated patients.

In a systematic review and meta-analysis of controlled trials on early enteral feeding versus “nil by mouth” after gastrointestinal surgery, eleven studies with 837 patients it was concluded that there was no clear advantage of keeping patients nil by mouth after elective gastrointestinal resection and early feeding may be of benefit. Since surgical patients are subjected to postoperative stress and hypercatabolic state, these patients require some form of nutritional support in the form of enteral or total parenteral nutrition (TPN).Although there is strong evidence that “nil by mouth” is not justified, the data are still conflicting over the role of early enteral nutrition compared with the traditional methods of postoperative feeding including total parenteral nutritional support. [2]

AIMS & OBJECTIVES

To compare the feasibility, safety and efficacy of early versus delayed oral feeding after elective intestinal anastomosis.

MATERIAL & METHODS

The present prospective and randomized trial included 50 patients undergoing elective intestinal anastomosis . Patients were divided into two groups of 25 patients each.

Group I who were allowed oral feeds in the early postoperative period (6-8 hours after surgery).

Group II consisted of 25 patients who were kept “nil by mouth” in postoperative period. These cases were allowed orally on appearance of bowel sounds and passage of flatus as being done routinely.

In all the cases a detailed clinical history was taken followed by clinical examination and relevant investigations .Preoperative serum proteins with A/G ratio estimation were done to document the nutritional status of the patient before surgery. Preoperative gut preparation was done by oral polyethylene glycol in all the cases of both groups and surgery was performed by consultant surgeon in all cases. Perioperative antibiotics were given as per routine to all patients of both groups.

In postoperative period, oral liquids (30ml/hour) were started after 6-8 hours of surgery in group I. In case of nausea or vomiting, the volume was decreased and it was noted down. In group II cases, oral feeds were started on passage of flatus as being done routinely. Timing of appearance of bowel sounds, passage of flatus and stools were recorded in all the cases of both the groups.

Postoperative complications in form of aspiration pneumonia, wound sepsis, intraabdominal abscess or anastomotic leak were recorded in all cases. Intraabdominal abscess and anastomotic leaks were diagnosed on basis of clinical and radiological examination (USG, X-ray, CT scan). Duration of postoperative hospital stay and any mortality was recorded in all cases of both the groups and datas were compiled and analysed by using Student's t-test.

OBSERVATIONS

Age of patients ranged from 15-60(mean 29.92 15.98) years in group A and 7-70 (38 14.34) years in group B. The difference in the mean age of the patients of two groups was not statistically significant (p>0.05). While comparing the sex distribution among cases of two groups, the difference was not statistically significant (p>0.05).3 cases in group A and 1 case in group B had associated medical illness in the form of pulmonary tuberculosis and were on anti tubercular therapy. One patient in group A had previous history of hypertension and IHD and she developed CVA in postoperative period leading to her mortality. While comparing the co-morbid medical illness between two groups the difference was not statistically significant (p>0.05).

The indications for surgery in majority of the cases were closure of ileostomy / colostomy that had been done earlier in emergency. Twenty-two cases in group A and 17 cases in group B had undergone previous laparotomy. Indications and type of Surgery in group A included : 13 ileostomy (enteric perforation 9, gut gangrene 1, tubercular abdomen 1, burst appendix 1, small gut tumor 1) 9 colostomy (traumatic perforation 7, gut gangrene 1, sigmoid volvulus 1). In group B : 8 ileostomy (enteric perforation 4, traumatic perforation 1, gut gangrene 1, low anterior resection 2) and 9 colostomy (traumatic perforation 7, burst appendix 1, low anterior resection 1) were done. The remaining 3 patients of group A (carcinoma colon2, tubercular abdomen 1) and eight of group B (carcinoma colon 5, small intestinal tumor 1, tubercular abdomen 1, idiopathic faecal fistula 1) underwent laparotomy for the first time. On statistical analysis the difference in number of abdominal surgery done previously in both the groups was statistically insignificant (p>0.05).

Most of the cases (16 each in group) underwent barium studies before ileostomy / colostomy closure for assessment of the status of gut distal to stoma. Three cases in the study group and 6 cases in control group required CECT abdomen for assessing the operability and resectability in cases having malignancy. No special investigations were done in 7 patients in group A and 6 patients in group B. Twenty (80%) of control group and 17 (68%) of study group patients were operated by vertical midline incision. Rest were operated by extending the stoma site either in transverse or obliqe direction. On comparing the type of incision used, the difference in the patients of both the groups was statistically insignificant (p>0.05).All the patients in study group and most of the patients in control group (92%) underwent single layer intestinal anastomosis. The difference on comparison in the type of anastomosis in both the groups was statistically insignificant (p>0.05).

In majority of patients of both the groups (68% in Group A and 60% in Group B) blood loss was <250ml (mean 242 89.52 in group A and 284 143.41 in group B). The amount of blood loss in the patients of both the groups was statistically insignificant (p>0.05).Mean duration of surgery was 106 42 minutes in group A cases and 128 36 minutes in group B cases, The difference was statistically insignificant (p>0.05).Post operative intraabdominal drain was put in 15 patients of Group A and 14 patients of Group B and on analysis, there was no statistically significant difference (p>0.05) between two groups.

Postoperative monitoring in either group is shown in table 1.

The difference in incidence of distention among the cases of both groups was statistically insignificant (p>0.05) similarly the difference in nausea and vomiting experienced by patients of both the groups was statistically not significant (p>0.05).Bowel sounds appeared on 1 st postoperative day in 24 cases (96%) in group A while in group B 16 cases (64%) had bowel sounds on 2 nd postoperative day. By 3 rd day every patient in both the groups had normal bowel sounds. Mean time for appearance of bowel sounds was 1.08 0.27 days in group A cases and 2.12 0.6 days in group B cases. On statistical analysis, bowel sounds appeared in a significantly shorter period of time in group A as compared to group B cases (p<0.05).Mean time for passage of flatus was 1.32 0.55 days in group A and 2.76 0.87 days in group B, group A cases were able to pass flatus in significantly shorter period of time than group B cases (p<0.05).Mean time for passage of stools was 2.28 0.89 days in group A and 3.92 0.909 days in group B. On statistically analysis group A cases were able to pass stools in significantly shorter period of time than group B cases (p<0.05).

In group A cases clear liquid diet (30ml/hour) was started within 6-8 hours of surgery, which was gradually increased. Initial oral feeding was tolerated in 23 cases (92%). Semisolids and solids were added to diet from 2 nd postoperative day onwards. In one case, delayed vomiting developed on 6 th postoperative day that required nasogastric drainage.In group B cases, oral feeding was started after appearance of bowel sounds and passage of flatus as being done earlier in routine practice. Oral feed could be started on 4 th postoperative day in only 2 cases (8%). In majority of the cases (19 cases i.e. 76%) oral feed could be started from 5 th to 7 th postoperative day. Four cases (16%) could start taking oral feed after 7 th postoperative day due to delayed appearance of bowel sounds and passage of flatus.

Mean time for the resumption of normal feed was 5.28 2.70 days in group A and 9 5.05 days in group B. On statistical analysis initiation of oral feeds as well as resumption of normal diet was achieved much earlier in group A cases in comparison to group B cases (p<0.05).During preoperative work up assessment of nutritional status was done by clinical examination and by estimation of serum proteins with A/G ratio, the difference in the levels of serum proteins was not significant among cases of the two groups (p>0.05).In postoperative period majority of the cases in group A (16 cases i.e. 64%) had serum protein value of 6.1-7gm%, while majority of the cases in group B (16 cases i.e. 64%) had serum proteins between 5.1-6gm%. On statistical analysis, serum protein level of group A cases were significantly higher in comparison to group B cases (p<0.05).

Two patients in group A had clinical features of postoperative pneumonitis while none of the patients in group B had postoperative pneumonia. Four patients (16%) in group A and seven patients (28%) in group B had wound discharge which was purulent in 1 case of group A and 5 cases of group B. In group A patients, in the only patient having purulent discharge, swab culture revealed E.coli sensitive to ceftizoxime.In group B patients out of 5 patients who had purulent discharge, 2 revealed resistant Pseudomonas infection, 1 revealed E.coli sensitive to ceftizoxime and 2 cultures were sterile. All the cases with discharging wound healed with conservative treatment except one case in group B who had burst abdomen on 5 th postoperative day.

Three patients (12%) in group B and 2 patients (8%) in group A had anastomotic leak in the postoperative period. In group A, one patient of ileostomy closure, who had undergone ileostomy for enteric perforation 2 months ago was discharged on 5 th postoperative day. He was readmitted with high grade fever, diarrhea and vomiting on 14 th postoperative day. On clinical examination and investigations patient was found to be having pelvic abscess with sub acute intestinal obstruction. Approximately 100cc pus was drained per rectally but distention abdomen, tachycardia and fever persisted. His widal test for enteric fever was positive. Patient was explored on 20 th postoperative day and operative findings revealed multiple small perforations proximal to the anastomosis with interloop abscess which were possibly due to relapse of enteric enteritis. Resection of involved segment with proximal ileostomy was done. In second patient there was fecal wound discharge on 7 th postoperative day. The patient was explored and operative findings revealed iatrogenic proximal leak possibly occult iatrogenic gut injury. Ileostomy was done and patient was discharged on 4 th postoperative day after second surgery.

Three patients in group B had anastomotic leak in the postoperative period. One patient had fecal wound discharge on 5 th postoperative day. Patient was explored and found to have partial disruption of anastomotic site. Ileostomy was done and patient was discharged on 11 th postoperative day after second surgery.Second patient who was operated for small gut tumour had bile discharge through wound on 4 th postoperative day. Reexploration revealed disruption of

suture line, necrosis of gut margins with dense adhesions. Ileostomy was done and patient was discharged on 6 th postoperative day after second surgery. Third patient underwent transverse colectomy with end to end anastomosis for carcinoma transverse colon. He had fecal wound discharge on 17 th postoperative day which on exploration revealed anterior disruption of suture line and 3 litres of feco purulent material in the peritoneal cavity. End colostomy with closure of distal stump and peritoneal lavage was done.

One patient in Group A died on 7 th postoperative day due to cardiovascular accident (posterior cerebral artery infarct) which was unrelated to the intestinal anastomosis. This patient had previous history of hypertension and ischemic heart disease. There was no mortality among group B cases.Majority of the patients (19 cases i.e. 76%) in group A were discharged on 4 th and 5 th postoperative day. Three patients of group A required hospitalisation for more than 10 days. In group B majority of patients (17 cases i.e. 68%) were discharged on 6 th – 9 th postoperative while 6 patients (24%) required hospitalization for >10 days. The mean hospital stay was 5.8 3.09 days in group A and 10.56 7.01 days in group B. On statistical analysis, duration of postoperative hospital stay was significantly more in control group as compared to the study group cases ($p<0.05$).

DISCUSSION

Traditionally after abdominal surgery, the passage of flatus, or bowel movement has been the clinical evidence for starting an oral diet. It is customary to keep the patients “nil by mouth” after gastrointestinal anastomosis till patient passes flatus. However, adequate nutrition has always been a major goal in postoperative care and now it is being increasingly recognized that withholding oral feeds for few days after surgery in such cases leads to nutritional depletion and its consequences. In the past few years, some studies have examined the role of early feeding after gastrointestinal anastomosis and found that it improved immunocompetence, decreased septic complications, improved wound healing and possibly improved anastomotic strength. [3456]

The mean age of the patients in study group was 29.92 15.98 years and 38 14.34 years in the control group and was comparable. In stuffy group 64% and 80% patients in the control group were males.

In our study majority of the cases of both the groups underwent gastrointestinal anastomosis for closure of stoma (ileostomy / colostomy) that had been created for enteric / traumatic gut perforations. Second major indication was malignancy of gut requiring resection and anastomosis of small or large gut.In the present study the approximate blood loss ranged from 150ml to 500ml (mean 242 89.53ml) in the study group and 200ml to 700ml (mean 284 143.41ml) in the control group cases. This was comparable to other previous studies except one by Kamei et al who reported significantly more blood loss [7] . This is possibly due to the fact that this Japanese study was conducted in cases of total gastrectomy only which is supposed to be more extensive procedure leading to more intraoperative bleeding. Patrelle et al in a study of 89 patients getting early entral feeding after colorectal surgery observed that on multivariate analysis, intraoperative blood loss was the only factor contributing to failure of early postoperative oral feeding [8] . It was hypothesized that more volume expanders were required to replenish the blood loss leading to bowel edema, prolonged ileus and hence oral feed intolerance. In the present study, out of 3 patients who didn't tolerated early oral feeds, only one patient had large volume of blood loss (450ml) during surgery.

In present study duration of surgery ranged from 70- 220 minutes (mean 106 42 minutes) in the study group and 80-280 minutes (mean 128 36 minutes) in the control group cases which was comparable.

The duration of surgery is more in the previous studies as compared to the present study obviously due to the fact that most of the cases were of gastrointestinal malignancies.

In the present study abdominal drain was put in 60% cases in study group and 56% cases in control group which was comparable.In a similar study by Stewart et al on early feeding after elective open colorectal resections, intraabdominal drainage was done in 37% cases of study group and 40% cases of control group. [9] In the present study out of 3 cases in study and 4 cases of control group who had postoperative anastomotic leak, intraabdominal drainage was done in 2 patients in study group and 4 patients in control group. However drain was not able to pick up anastomotic leak in any of the case and in all the cases anastomotic leak manifested as fecal/ billous discharge from main abdominal wound.

Oral feed was started within 6 hours of surgery and it was well tolerated in 88% cases of study group. Remaining 3 cases (12%) of the study group could not tolerate early oral feeds. Oral feeding had to be withheld for 2-3 days with nasogastric decompression in 2 cases (8%) and one patient

(4%) could continued to tolerate feed in small quantities. In other similar studies in the past on early oral feeding, the time of start of feed and its tolerance are shown in table [2] The tolerance to early oral feed in the present study is comparable to the results of previous studies. In study conducted by Stewart et al, tolerance to early oral feed is much less (65%) in comparison to other studies, possibly due to the fact that feed was started within 4 hours of surgery when residual effect of anaesthetic gases is still present [9] . However another important observation is that the tolerance to oral feeds is same in present as well as most of the previous studies despite the fact that early oral feed was started within 6 hours in the present study while in all other studies, oral feed was started within 24-72 hours of surgery. This indicates that oral feed can safely be started after 6 hours of surgery with good tolerance because effect of anaesthetic gases is over by that time.

In the present study 12% of patients in study group and 8% of patients in control group complained of nausea and vomiting after the start of oral feeds which was comparable.The percentage of patients who had nausea/ vomiting in other similar studies are comparable with the present study.The incidence of nausea and vomiting although not significant statistically was more in the study group as compared to the control group in the present study as well as most of the previous studies.Bowel sounds appeared in a significantly shorter period of time in study group (mean 1.08 0.27days) as compared to control group cases (mean 2.12 0.6days) ($p<0.05$).In a similar study by Fanaie et al there was no statistically significant difference in the appearance of bowel sounds among cases of two groups (0.5 0.6 vs. 0.5 0.5 days; $p=0.65$) [12] .

In the present study the mean time for passage of flatus was 1.32 0.55 days in study group and 2.76 0.87 days in control group and the difference was statistically significant ($p<0.05$)

In the present study as well as previous studies patients passed flatus much earlier in study group than control group.In the present study the mean time for passage of stools was 2.28 0.89 days in study group and 3.92 0.909 days in control group and the difference was statistically significant ($p<0.05$).In other similar studies, the time for passage of stool are comparable to present study.In the present study mean time taken in resumption of normal feed was 5.28 2.70 days in study group and 9 5.05 in control group and the difference was statistically significant ($p<0.05$). In a similar study by Stewart et al, on early feeding after elective open colorectal resections, full diet was resumed within 2-13 days (mean 5 days) in study group and 5-14 days (mean 8 days) in control group which is comparable with present study [9] . No other study in the past has analysed the parameter of resumption of normal feed.

Serum protein estimation was done in preoperative period and on the day of discharge in all the cases of both the groups. Values of the preoperative serum proteins were comparable among cases of two groups ($p>0.05$). However in postoperative period serum protein values were significantly more in study group as compared to control group ($p<0.05$). This occurred possibly due to early oral feeding which helped in improvement in nutritional status of patients of the study group.

In the present study 4% cases in study group and 20% cases in the control group had wound infection which was statistically significant ($p<0.05$).The results of metaanalysis of 11 studies by Lewis et al have also shown that incidence of wound infection although not statistically significant is less in early fed group ($p=0.074$) [13] . The same findings have been observed in present study although statistically significant ($p<0.05$).

In the present study 12% cases in the control group and 8% cases in study group had anastomotic leak which was comparable ($p>0.05$).In group A, out of 2 cases of intestinal leak first patient having relapse of enteric enteritis required 2 surgeries after the leak was detected. The second case in group A was found to have iatrogenic leak proximal to site of anastomosis. In group B one case of transverse colectomy and end to end anastomosis had postoperative anastomotic leak. All the cases of intestinal leak after surgery in both the groups were managed by creating stoma except 1 case in group A in which the leak was managed conservatively. Improved nutritional status in study group cases might have helped in decreasing wound sepsis, lesser anastomotic leaks and better wound healing. In the past also various workers have observed that wound healing as well as anastomotic strength improves in cases of early oral feeding. [46] In the previous studies although incidence of postoperative leak is mentioned but there is no mention regarding fate and further management of these cases.

Postoperative pneumonitis, intraabdominal abscess, burst abdomen and subacute intestinal obstruction were occasionally encountered in few cases of both the groups and on statistical analysis there was no significant

difference.In the metanalaysis conducted by Lewis et al the incidence of pneumonia and intraabdominal abscess was less in study group patients but the results were not statistically significant (p=0.85 & 0.84 respectively) [13] .

In the present study the mean duration of postoperative hospital stay was 5.8 3.09 days in study group and 10.56 7.01 days in the control group and the difference was statistically significant (p<0.05).Duration of hospital stay in present study is comparable with the previous studies except the study by Kamei et al [50] where postoperative hospital stay is much longer(table 3).It is possibly due to the fact that Kamei et al conducted their study in patients undergoing radical gastrectomy for carcinoma stomach that required prolonged hospitalization [7] . One significant observation made by all these workers including present study is that postoperative hospital stay is significantly shorter in study group cases as compared to control group cases. It is possibly due to the fact that early feeding helps in early bowel movements, faster recovery, less postoperative complications leading to early discharge from the hospital.

CONCLUSION

Early oral feeding after elective gastro intestinal anastomosis is well tolerated,healps in early resolution of ileus, decreased wound infection and improved wound and anastomotic healing leading to short hospital stay and reduced treatment cost. Hence it is concluded that early oral feeding after intestinal anastomosis is safe, effective and beneficial to the patients. However, larger, prospective and randomized trials are needed to establish the facts observed in the present as well as previous similar studies.

Figure 1

Table 1

Post-operative day	Group A (n=25) (Study group)					Group B (n=25) (Control group)					
	Distention	Nausea/ vomiting	Appearance of bowel sounds	Passage of flatus	Passage of stools	Distention	Nausea/ vomiting	Appearance of bowel sounds	Passage of flatus	Passage of stools	Ryle's tube removed
Day 0	0	0	0	0	0	1	1	0	0	0	0
Day 1	2	2	24	18	3	0	0	4	0	0	0
Day 2	0	1	1	6	14	1	1	16	11	1	1
Day 3	0	0	0	1	5	0	0	5	10	12	0
Day 4	0	0	0	0	1	0	1	0	4	6	4
Day 5	0	0	0	0	1	0	0	0	0	6	7
Day 6	1	1	0	0	0	1	2	0	0	0	4
>Day 6	0	0	0	0	1	0	0	0	0	0	2

Figure 2

Table 2

Studies	Time of start of early feed	Early feed tolerated (%)
Choi et al[10] (1996)	48-72 hours	90%
Stewart et al[9] (1997)	Within 4 hours	65%
Patrelli et al[8] (2001)	24-48 hours	73%
Difronzo et al[11] (2002)	48-72 hours	89.6%
Present study (2007)	Within 6 hours	88%

Figure 3

Table 3

Studies	Duration of hospital stay (days)		P value
	Study group	Control group	
Choi et al[10] (1996)	4.2 (3-8)	6.7 (5-34)	<0.05
Stewart et al[9] (1997)	9 (5-28)	11 (6-18)	0.10
Defronzo et al[11] (2002)	3.6 (3-8)	7.1 (5-12)	<0.05
Kamei et al[7] (2005)	23.1±7.2	27.6±4.7	0.0345
Tsunoda et al[14] (2005)	7 (7-40)	10 (8-48)	0.01
Present study (2007)	4.8±2.3	7.4±4.2	<0.05

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