



Early use of Low Residue diet is Superior to Clear Liquid Diet after Elective Colorectal Surgery – A Comparative Study

Authors

Saxena A¹, Saurabh KS²

Department of Surgery, NSCB Medical College and Hospital, Jablapur, India

Abstract

Background: At the time of discharge, acceptability of oral feeds is one of the major criteria, so initiating early feeds gives patient the advantage of early feed acceptability and shorter hospital stay.

Objective: To assess the effect of early clear liquid diet vs. early low residue diet in terms of feasibility and outcome in patients with colorectal anastomosis and to study the outcome of early initiation of low residue diet on acceptability, complications and length of hospital stay.

Methods: It was a comparative, non-randomized study done. Total 30 patients undergoing colorectal anastomosis, for various indications were allotted into two groups. One group was given clear liquid as initial feed and the other group was given Low residue diet. Patients were studied for post-operative vomiting, abdominal distension, NG tube decompression required post-operatively, number of days on intravenous anti emetics, anastomotic leak and wound dehiscence.

Results: Early initiation of feeding in patients undergoing elective colorectal surgery resulted in early return of bowel functions, early feed acceptability and shorter hospital stay.

Introduction

The concept of post-operative ileus as paralysis of the entire bowel with the complete absence of any functional contractile activity is misleading. When post-operative ileus develops, it is usually transient and clinically not significant.^{1,2} whereas post-operative dysmotility predominantly affects stomach, the small bowel recovers normal function 4-8 hours after surgery.^{3,4,5} Despite accumulated scientific evidence that promote early enteral feeding, these are still not commonly practiced at the bedside.

The study was done to assess the effect of early clear liquid diet vs. early low residue diet in terms of feasibility and outcome in patients with colorectal surgery.

Material and Methods

It was a comparative and non-randomized study which was done at our institute from March 2015-August 2016. Consecutive type of non probability sampling was followed for the selection of study subjects. Permission of institutional ethical committee was taken besides taking consent of all the patients. Total of 34 patients were taken into study, out of which 30 patients were divided equally and allocated to two groups, Group A who received low residue diet as early feed and Group B who received clear liquids as early feed. Four patients out of 34, had to be excluded from the study due to various reasons, which included intra-operative cardiac event in one patient,

extensive adhesiolysis in two patients and iatrogenic bowel injury in one patient.

Inclusion criteria was all adult patients (>18 years) undergoing elective colorectal surgery, in which the anastomosis is either colo-colic or colorectal, in the above mentioned period were included. The exclusion criteria were patients who were on pre-operative total parenteral nutrition, septic patients, unexpected intra-operative surgical or anaesthetic life threatening complications and surgical findings requiring post-operative use of nasogastric tube which was preferred over early feeding in patients undergoing extensive adhesiolysis.

All the patients who were taken in the study groups were assessed pre-operatively using various imaging and diagnostic modalities and underwent primary anastomosis either colorectal or colocolic without any bowel diversion procedure. All the patients were given adequate bowel preparation before the procedure. All the operations were performed by authors and their colleagues having vast experience in gastrointestinal and oncologic surgery. All the surgeries were done by open method. The various indications for which surgery was done is shown in Table 1.

Table 1

Diagnosis	Group A (LRD)	Group B (CF)
Ca Recto-Sigmoid Junction	3	1
Other site Colonic Malignancies	6	5
Colostomy previously done for Emergency Conditions	6	9

Results

The baseline characteristics of the patients are shown in Table 2. Both the groups were comparable in terms of age, height, and weight

Table 2

Variable	Group A	Group B	P value
Age (years)	36.93	41.00	0.411
Weight (Kg)	52.00	53.27	0.674
Height (cm)	158.13	156.13	0.438
BMI	20.90	20.89	0.994

The patients who had history of previous abdominal surgery for various reasons as

Group A patients received low residue diet after completion of 24 hours postoperatively. Low residue diet consisted of refined soaked bread, white rice, mashed cooked potatoes, refined ground fish and eggs. Group B patients received clear liquid diet, which consisted of clear broths and strained fruit juices. The patients of group B who did not experienced nausea and vomiting on Post-operative day 1, were switched to low residue diet.

The assessment of outcome consisted of one end point as post operative vomiting, and patients were switched back to nil by mouth status and naso gastric aspiration was started, if the event occurred any point after initiation of orals in both the groups. The secondary end points for assessment of efficacy and outcome included abdominal distension, time to passage of flatus, time to tolerance of feed, need of naso gastric decompression, length of hospital stay, and post-operative morbidity in terms of anastomotic leak and wound dehiscence.

For statistical analysis, SPSS software was used. The test performed included t-test, Fisher's exact test and Chi-square test. (p value <0.05, level of significance)

and body mass index. The patient age ranged from 18-65 years. There were 24 males and 6 females in the study.

mentioned before were found to have no significant difference statistically when compared

between the two groups. The patients who had history of previous abdominal operations were patients who were on colostomy and underwent colostomy closure as their operative procedure. The insignificant statistical difference showed that if a patient has history of previous abdominal surgery, it didn't affect the outcome variables of our study. Insignificant statistical difference was found for the patients who had history of smoking. GERD/Gastritis history was also found to be statistically insignificant. There was one case which had history of DM type 2 and was on medications, although the history of DM 2 didn't had any effect on the outcome variables.

Vomiting on Post-operative day 1 - This difference was found to be statistically significant in terms of the outcome measures with patients of Group A having significantly less vomiting on POD 1 as compared to the Group B patients. This indicated that a Low residue diet was tolerated well than clear fluid diet on Post-operative day 1. ($p = 0.02$)

Abdominal distension- Although the value was statistically insignificant, it was observed by the data that the patient who had Low residue diet as their first feed had less discomfort as compared to the patients who had clear fluid diet as their first feed. ($p = 0.259$)

Naso gastric decompression - We routinely removed NG tube in the post operative period in both the groups, after the patient underwent elective colorectal surgery. After the statistical analysis of this independent variable, it was found that the need for NG tube decompression was significantly less in the low residue diet arm group as compared to the patients who received clear fluids as initial feeds. (p value = 0.20)

Appearance of bowel sound - It was taken as indicator of bowel movement which showed disappearance of post-operative ileus. On statistical analysis it was found that appearance of bowel sound was earlier in patients who received LRD as their initial feed. The difference was statistically significant. (p value= 0.001)

Time to passage of flatus - This was strictly based on reporting by the patient for the passage of first flatus. This indicated the return of bowel functions after post-operative ileus. Defecation was not taken as a measure because it may just represent the colonic emptying of residual stools and not necessarily the return of bowel functions. This difference was statistically significant. (p value=0.001).

Time to tolerance of feeds - it was calculated as the time at which patient tolerated the feeds, and didn't had any adverse effect after the feed was initiated in terms of abdominal distension or vomiting. On statistical analysis, it was found that the patients of LRD arm tolerated feeds much earlier than the patients who were in CF arm, which was statistically significant. (p value = 0.004)

Number of days on intravenous anti-emetics - It indicated the number of patients who needed anti-emetics for management of vomiting if occurred during the feed. This prevented further episodes of vomiting and hence was useful in preventing complications like aspiration pneumonitis in the patients.. It is to be noted here that all the patients were given anti-emetics in the intra operative period and we have taken into account the patients who required anti-emetics post-operatively. The difference was found to be statistically significant. (p value=0.004)

Post-operative length of hospital stay - The day of discharge was found to be statistically significant when compared between the two groups with patients of LRD arm being discharged earlier than CF arm as their progress to the tolerability of the feeds was significantly earlier than the CF arm patients. Since the treatment including surgery and hospitalization at our centre is free of cost as a government policy, so the cost effectiveness factor was not calculated.

The incidence of wound dehiscence, which was taken as either the laparotomy wound dehiscence or the stoma closure site wound dehiscence, was found to be low in the patients of LRD group although the difference was not statistically

significant, which may lead us to think that early feeding and its tolerance has its effect on body metabolism and wound healing.

There were no reported cases of anastomotic leak in our study, and none of the patients who underwent the procedure showed any signs or symptoms of leak. This may be attributed to the fact that most of the operations were done under

all aseptic precautions and after adequate bowel preparations. There was one case, who suffered aspiration pneumonitis, after vomiting of feed on postoperative day 1. The complication was managed conservatively and it didn't affect the outcome of the study as found out by statistical analysis.

Comparison of study variables of two groups are summarized in table 3.

Table 3

Variable	Group A	Group B	P Value
Bowel sound(days)	1.67	2.93	0.001
Passage of flatus (days)	2.33	3.73	0.001
Tolerance to feed (days)	1.27	2.87	0.004
IV antiemetic use (days)	0.20	2.27	0.004
Hospital stay (days)	7.93	9.07	0.001

Discussion

Early introduction of adequate post-operative oral nutrition is essential to attenuate the magnitude of inflammatory response and nitrogen losses sustained in the post-operative period^[6]. Even with increasing utilization of enhanced recovery pathway protocols, these are still not followed as bed side practice. On nutritional point of view, keeping patients NPO or resuming with Clear fluids, is associated with inadequate basal metabolic needs of a surgical patient, much less of the increased demands of post surgical period and hence do not adequately contribute much in reversing the caloric deficit after surgery^[7]. We chose vomiting as primary end point because it is a very objective end point as opposed to nausea scores or pain scores. Of note, nausea can occur in response to olfactory, visual and psychogenic stimuli and can also be related to the type of oral diet presented to the patient. Vomiting is also a marker for safety in patients because if a patient vomits, there is high risk of aspiration pneumonia. Both bilious and non-bilious vomiting of undigested food was considered positive.

The baseline variables between our patients were comparable and no change in these variables led to change of results or affected the outcome. The mean operative time calculated for our study was 139.33 minutes for Group A and 99.0 minutes for

Group B, when calculated statistically found to be insignificant. In our study operative time, amount of blood loss intra-operatively, age, gender, type of operation and previous abdominal operation had no impact of statistical significance. One patient out of 30 patients had aspiration pneumonitis which was managed conservatively. There were no reported cases of post-operative anastomotic leak in our study of 30 patients. All patients in the study received intra-op dose of anti-emetics. Time to flatus was shorter in the LRD arm, demonstrating earlier return of bowel functions. We did not take defecation as parameter as it may simply reflect colonic emptying and not necessarily the return of bowel movements^[8]. Feeding may actually be helpful in enhancing return of post operative bowel function by stimulating bowel motility^[9]. Food intake stimulates colonic motility by means of gastro-colic reflex in early post-operative patients as it does in healthy population^[10]. In our study, the LRD group had shorter time to tolerance of LRD and given that tolerance to solid diet is a crucial discharge criterion, this translated to a significantly shorter length of hospitalization. It may be questioned that why early use of LRD would be more effective than CF after colorectal surgery? The probable explanation to that is providing solid food instead of CF to a starving

post-operative patient is intuitive to the concept of “use it or lose it”. Fat which is not a part of CF diet is a potent trigger of ileal motility^[11]. In addition, although carbohydrate rich foods like CF induce a colonic motor response, the effects are short lived when compared with fat meals^[12].

There were a few limitations to our study. The assessors were not blinded to the diet choice, passage of first flatus strongly depended on patient reporting, the choice of easily available diet for Vegetarian patients was mashed potato while non-vegetarians had the option of boiled egg. We also didn't have the caloric intake chart; rather we measured the total volume of diet intake per day. One of the problems we went through was that there is no standardized protocol for enhanced recovery after surgery.

Since the study was mainly confined to colonic anastomosis sites, it appeals to be tried at small bowel and ileo-colic anastomotic sites in future. Also the advancement of diet on early post-operative to full diet is still an attractive option to explore.

Conclusion

Initiation of early post-operative feeds with low residue diet results in early return of bowel functions, early acceptability of feeds, less incidence of post-operative vomiting and shorter hospital stay, as compared to clear liquid diet.

Acknowledgements

We acknowledge the patients for giving their consent in taking part in the study.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

References

1. Pearl ML, Valea FA, Fischer M, Mahler L, Chalas E. A randomized controlled trial of early postoperative feeding in gynaecologic oncology patients

- undergoing intra-abdominal surgery. *Obstet Gynecol.* 1998;92:94-7.10.1016/S0029-7844(98)00114-8.
2. Bufo AJ, Feldman S, Daniels GA, Liberman RC, Early postoperative feeding. *Dis Colon Rectum.* 1994;37:1260-5.10.1007/BF02257793.
3. Silk DBA, Gow NM. Post-operative starvation after gastrointestinal surgery. *British Medical Journal.* 2001;323:761-2.10.1136/bmj.323.7316.761
4. Casto CJ, Krammer J, Drake J, Postoperative feeding: a clinical review. *Obstetrical and Gynecological Survey.* 2000;55:571-3.10.1097/00006254-2000090000-00022.
5. Oritz H, Armendariz P, Yarnoz C. Is early postoperative feeding feasible in elective colon and rectal surgery. *International Journal Of Colorectal Disease.* 1996;11:119-21.10.1007/s003840050032.
6. Grimble RF. Basics in clinical nutrition: Main cytokines and their effect during injury and sepsis. *e-SPEN.*2008;3:289-292
7. Hancock S, Cresci G, Martindale R. The clear liquid diet: when it is appropriate? *Curr Gastroenterol Rep.* 2002;4:324-331.
8. Boeckxstaens GE, de Jonge WJ. Neuroimmune mechanisms in post-operative ileus. *Gut.*2009;58:1300-1311.
9. Toumadre JP, Barclay M, Fraser R et al. small intestinal motor patterns in critically ill patients after major abdominal surgery. *Am J Gastroenterol.* 2001;96:2418-2426
10. Kasperek MS, Mueller MH, Glatzle J et al. Post operative colonic motility increases after early food intake in patients undergoing colorectal surgery. *Surgery.* 2004;136:1019-1027.
11. Kamath PS, Phillips SF. Initiation of motility in canine ileum by short chain fatty acids and inhibition by pharmacological agents. *Gut.* 1988;29: 941-948.

12. Rao SS, Kavelock R, Beaty J et al. effects of fat and carbohydrate meal on colonic motor response. Gut 2000;46:205-211.