

## AN ANALYTICAL STUDY ON EARLY ENTERAL FEEDING IN ABDOMINAL SURGERIES

Zahir Hussain<sup>1</sup>, T. Natraj<sup>2</sup>, Karunamoorthy Rajachidambaram<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of General Surgery, Chennai Medical College Hospital & Research Centre, Trichy, Tamilnadu.

<sup>2</sup>Associate Professor, Department of General Surgery, Karpagam Faculty of Medical Sciences & Research, Coimbatore.

<sup>3</sup>Associate Professor, Department of General Surgery, Chennai Medical College Hospital & Research Centre, Trichy Tamilnadu.

### ABSTRACT

#### BACKGROUND

Studies were undertaken to evaluate whether different abdominal surgeries could benefit from early enteral feeding. Early feeding improves the outcomes of patients with trauma and burns, although few studies have examined its use after surgeries. This study compares an early regular diet to conventional postoperative dietary management to determine GI complications after abdominal surgeries.

The aim of the study is to analyse and compare early enteral feeding with conventional postoperative dietary management to access complications after abdominal surgeries.

#### MATERIALS AND METHODS

Place of study- Department of General Surgery, Chennai Medical College and Research Centre.

Period of study- Between January 2015 to February 2017. Totally, 50 patients who had undergone various abdominal surgeries in that 25 cases are subjected to study and remaining 25 were control objects.

#### RESULTS

The results of our study the effect of enteral feeding analysed by the main outcome measures like vomiting, wound infection, mortality showed significant betterment to the control group. The length of the hospital stay was relatively less.

#### CONCLUSION

This study provides evidence to support the use of enteral feeding in surgical patients and indicate no increased morbidity or mortality. For early enteral nutrition to be effective, it must actually be received and tolerated by the patient.

#### KEYWORDS

Enteral Feeding, Postoperative Dietary, Early Diet in Abdomen Surgeries.

**HOW TO CITE THIS ARTICLE:** Hussain Z, Natraj T, Rajachidambaram K. An analytical study on early enteral feeding in abdominal surgeries. J. Evid. Based Med. Healthc. 2017; 4(87), 5099-5104. DOI: 10.18410/jebmh/2017/1020

#### BACKGROUND

Studies were undertaken to evaluate whether different abdominal surgeries could benefit from early enteral feeding.<sup>1</sup> Early feeding improves the outcomes of patients with trauma and burns, although few studies have examined its use after surgeries.

This study compares an early regular diet to conventional postoperative dietary management to determine GI complications after abdominal surgeries.

The secondary purpose of this study is to evaluate the incidence of postoperative ileus after major GI surgeries with early feeding in comparison with conventional diet.

The aim of the study was to assess whether early postoperative enteral feeding in the form of a balanced diet

formula is safe and beneficial to patients who have undergone various abdominal surgeries while comparing with control subjects who have undergone the same procedures, but started on conventional method of nil by mouth.<sup>2</sup> on early postoperative period.

#### MATERIALS AND METHODS

Between January 2015 and February 2017, totally 50 patients at the Department of General Surgery, Chennai Medical College & Hospital who had undergone various abdominal surgeries both emergency.<sup>3</sup> and elective were offered participation, and those who agreed gave informed consent. Out of the 50 cases, 25 were subjected to the study and remaining 25 were the control subjects.

Case Selection- Patients with histories of intestinal anastomosis, appendicitis, perforation, intra-abdominal infection were included. Patients who had laparoscopic procedures were also included.

#### Data Collection

1. Information collected included the age, sex, medical and surgical histories of the patients and indications for surgery.
2. The length of time until bowel movement was first passed was noted.

Financial or Other, Competing Interest: None.  
Submission 21-09-2017, Peer Review 26-09-2017,  
Acceptance 17-10-2017, Published 28-10-2017.

Corresponding Author:

Dr. Karunamoorthy Rajachidambaram,  
Associate Professor, Department of General Surgery,  
Chennai Medical College Hospital & Research Centre,  
Trichy, Tamilnadu.

E-mail: drkrajachidambaram@gmail.com

DOI: 10.18410/jebmh/2017/1020



3. The patients were assessed on morning and evening for bowel function variables, including normal bowel sounds and passage of flatus and bowel movement.
4. Patients were not given oral or rectal bowel stimulants after surgery.

Post-operatively besides parenteral fluids, a broad-spectrum antibiotic combination of a cephalosporin, metronidazole, and an aminoglycoside was given.

Patients in the early feeding group were offered simply a liquid diet within 12 h of arrival on the ward. 100 gms of a balanced diet formula (tender coconut water) was given slowly. The feed was slowed/stopped, if patient developed intolerable distension, uneasiness, vomiting, heaviness, hiccough or crampy abdominal pain. The feeds were administered to an awake patient who was propped up at 30°. The patient received another 300-400 Cals in the form of I.V. Dextrose.

The conventionally managed patients received the same management except that they received calories only in the form of I.V. dextrose containing fluids which amounted to 600 Calories on an average. If they tolerated 1 liter within 24 h, they were started on free liquid on the second day, and regular diet on the third day.

Throughout the postoperative period, patients received parenteral antibiotics and supportive I.V fluids providing additional 300-400 calories. In both groups, the nasogastric tube was removed immediately before starting the feeds. Patients with normal postoperative course were discharged when they could tolerate a regular diet.

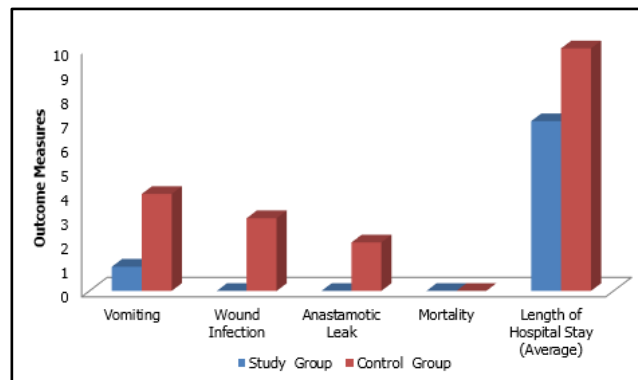
In our study, we compared that length of hospital stay to evaluable all postoperative complications equally in both groups. The main outcome was to evaluable postoperative complications.<sup>4</sup> that included wound infection, leakage of anastomosis, would dehiscence, prolonged ileus, hospital stay and mortality.

Postoperative ileus.<sup>5</sup> was managed by IV Hydrations, no oral intake antiemetic, and radiological evaluation of the abdomen. If vomiting was unresponsive to antiemetic, a nasogastric tube was placed and removed after symptoms resolved. On the day of discharge, they answered questions about nausea, vomiting, cramping, distention, desire for oral feeding, and first day of flatus passage or bowel movement.

Analysis of Study- The effect of early enteral nutrition in 25 operated patients of abdominal surgeries.<sup>6</sup> peritonitis was studied. The results were compared with 25 control patients operated who were kept nil by mouth for 5-7 days with continuous NG tube aspiration, I.V. fluids (Dextrose based) and I.V. antibiotics. The results were analysed.

The main outcomes measures are shown in the table below-

Sl. No.	Outcome Measures	Study Group	Control Group
1.	Vomiting	1	4
2	Wound Infection	-	3
3.	Anastomotic Leak	-	2
4.	Mortality	-	-
5.	Length of Hospital Stay (Average)	7	10



Graph 1

The relative risk of major complications like leaking of repaired perforation, anastomotic dehiscence, wound dehiscence, wound infection, septicaemia, pneumonia, and mortality was significantly lower than the control cases. The duration of the hospital stay was less in the patients receiving enteral nutrition.

The key finding in our study was that postoperative complications did not differ significantly between the two groups. Similarly, oral feeding was tolerated with low morbidity following small bowel perforation and not associated with the occurrence of wound dehiscence. The results are comparable to those reported for laparoscopic procedures.

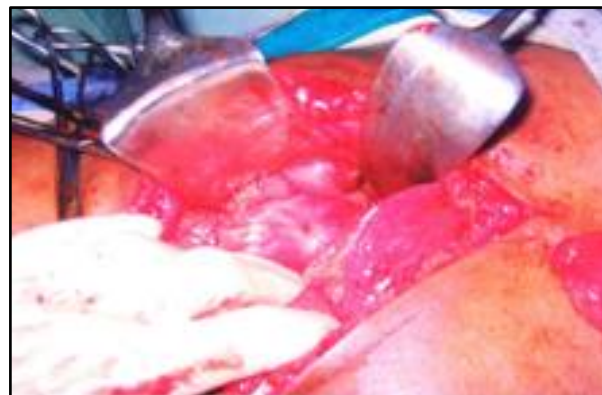


Figure 1



Figure 2



**Figure 3**



**Figure 4**

## DISCUSSION

### Nutritional Support in Postoperative Patients-

Indications for Nutritional Support- Indications for nutritional support should consider the following-

1. The pre-morbid state (healthy or otherwise).
2. Nutritional status.
3. Age of the patient.
4. Duration of starvation.
5. The likelihood of resuming normal intake soon.
6. Weight loss of 15% and,
7. A serum albumin value less than 3.0 gm. per 100 ml.

In critically ill patients, nutritional supplementation should be undertaken more readily than in those less severely stressed.

### Routes of Administration-

Two routes are possible-

1. The enteral route, using, stomach or preferably small intestine, and
2. Parenteral route.

The parenteral route in discussing the parenteral route, several facts will be made.

1. Protein is mixture of single amino acids of synthetic origin, produced from intelligent bacteria cultures. At present, Japan is the sole source. Although hydrolysates are available, there is much protein wastage in the hydrolysates, because hydrolysis is

incomplete. Legally, 55% of the protein is hydrolysed to amino acids to qualify as a hydrolysate. The residual dipeptides and tripeptides are not efficiently utilized when infused intravenously. A further advantage of synthetic amino acid solutions is different solutions of different disease states (hepatic and renal disease).

2. Caloric supply is hypertonic dextrose. A few solutions, intended for peripheral administration, use fructose and/or glycerol
3. Fat consists of 10% or 20% emulsions of soy or safflower oil, usually stabilized with egg phosphatide and lecithin. Newer fat sources using omega-3 sources are not yet available for intravenous use. Structured lipids – mixtures of different side chains on a single glycerol molecule – are not yet available for commercial use.

### The Peripheral Route-

Parenteral Administration- The peripheral route is used largely in hospitals without formal nutritional support programs. It is useful only under very limited circumstances, when the duration of parenteral nutrition will be limited or one is not certain that parenteral nutrition will be required.

When the risk of catheter sepsis is significant because of the lack of a protocol and a nutritional support team to enforce that protocol, peripheral hyperalimentation may be safer, but the needs of sick patients are rarely satisfied by this approach.

In the lipid system, caloric need is satisfied by 10% or 20% fat emulsions given with amino acids and 5% dextrose. Amino acids given in water without dextrose have to advantage. The hypothesis of Flatt and Blackburn, which proposed the administration of dextrose-free amino acids by allowing the utilization of endogenous fat secondary to lower plasma levels of insulin, has been thoroughly discredited. The rationale for (hypocaloric) amino acids and 5% dextrose, or glycerol, is an attempt to minimize nitrogen breakdown for limited periods of time.

Theoretically, glycerol is an acceptable carbohydrate, and the avoidance of expense of pharmacy mixing is an advantage.

### Parenteral Administration-

Central Approach- In central hyperalimentation (TPN), the catheter terminates in the superior vena cava, although the inferior vena cava may be used.

Silastic or Teflon-coated catheters have replaced polyvinyl chloride-coated catheters; they are less reactive and probably associated with a lower incidence of subclavian and vena caval thrombosis.

Percutaneous (or open through the axilla) placement of indwelling permanent catheters is being done early in patients in whom the need of a central indwelling line for weeks is obvious, because it is likely that the incidence of thrombosis and/or sepsis is lower with these catheters.

Infuse-A-ports are being used with increasing frequency, although the incidence of sepsis is higher.

Safe TNP requires an organization composed of nurses, physicians, and pharmacists and an enforced protocol.

#### Requirements for Nutrition.<sup>7</sup>

Safe protein requirements are 250 mg of protein equivalent per kg per day. Normally, 35 kcal per kg per day is adequate.

A 20% to 25% of non-protein calories as fat is probably optimal for hepatic protein synthesis. Adequate vitamins and trace minerals should be given, most authorities advocate two to five times the requirement for water-soluble vitamins and minimal daily. Requirements for the fat-soluble vitamins that are toxic in excess.

#### Indications for Parenteral Nutrition-

Indications for parenteral nutrition may be organized into three categories, depending on desired outcome-

1. Primary therapy: Parenteral nutrition is thought to influence disease,
2. Supportive therapy: nutritional support is achieved and does not alter disease processes; and,
3. Controversial or under intensive study. These indications are listed in

#### Enteral Nutrition-

**General Principles of Enteral Feeding-** The stomach is the principal defense against an enteral osmotic load. After bolus administration of hyperosmotic fluid, gastric motility stops and gastric secretion proceeds until gastric contents are iso-osmotic, at which point transfer across the pylorus begins. The small bowel is less able to dilute osmotic loads when they are administered directly. Moreover, gastric acid secretion, which normally prevents bacterial contamination of the gastrointestinal tract, may be neutralized by constant infusion into the stomach; thus, bacterial overgrowth in the gastrointestinal tract may occur. If nutritional solutions are not properly refrigerated, bacterial overgrowth may occur in the container.

The small bowel is the principal were for nutrient absorption. Dipeptides and oligopeptides are preferred for protein absorption, not single amino acids, although this has been challenged recently, with normal gut function, this is unimportant, because protein is completely absorbed in the first 120 cm of jejunum. With short or diseased bowel, there may be an advantage to dipeptides. Carbohydrate is also absorbed high in the jejunum, with simple sugars preferred. Complex sugars, such as disaccharides, require enzymatic cleavage.

A common difficulty with patients who are ill is acquired lactase deficiency, which often corrects itself in time, but in the early recovery phase, lactose-containing foods may cause diarrhoea.

Fat is most difficult to absorb, depending on proper release and mixing of bile and pancreatic enzymes. After gastrectomy, pancreatic resection or complex upper abdominal operations, such relationships are disturbed, and proper mixing of bile and pancreatic enzymes does not occur. Fat absorption after gastrectomy is diminished after Billroth

II, less so with Billroth I, procedures. Calcium, iron, and other metals are absorbed in the duodenum. Consequently, duodenal bypass (as after Billroth II gastrectomy) results in long-term deficiencies of these ions.

**Other Functions of the Gut-** At least 22 Gut hormones have been described, and an equally complex series of endocrine-like cells.

**Immunologic Functions of the Gut-** The gut is the largest immunologic organ in the body and contains large numbers of lymphocytes, plasma cells, and macrophages, often in large accumulations, such as Peyer's patches.

The immunologic functions of the gut are important because of the improvements in survival and outcome in posttraumatic patients receiving enteral as opposed to parenteral nutrition. Whereas some have focused on gut mucosal barrier integrity as the principal cause of this improvement, an equally likely alternative might be improvement in overall immunologic function.

Another important and poorly understood function of the gut is the secretion of mucin, presumably as a protective feature. Production of mucin is dramatically increased in sepsis.

**Practicalities of Enteral Feeding-** A major recent change in nutritional support is the realization that the gut may be more efficacious, at least in burns and trauma, as compared with parenteral nutrition. Enteral nutrition has not been emphasized as much as parenteral nutrition, because it has been assumed that in many disease states, the gut will not work. With effort, it turns out that the gut works and can be used but that perhaps it cannot provide total nutritional support. Still, there is probably significant benefit from utilizing the gut for partial nutritional support.

Therefore, one should approach nutritional support with two goals in mind-

1. To use the gut if possible and
2. If total nutritional supplementation cannot be provided by gut, to administer at least 20% of the caloric and protein requirements by gut.

Because hyperosmolar solutions are better tolerated by the stomach than by the intestine, enteral feeding is best given by the smallest possible nasogastric tube; to prevent aspiration the tube should end in duodenum or intestine. Mortality from enteral feeding is largely due to aspiration, and gastric motility may be suddenly altered in sepsis. A 10-French Silastic catheter is adequate for most enteral diets; an 8-French tube will not accept some of the thicker hydrolysates because it plugs easily. Patients should be infused constantly, with the bolus technique reserved for special situations. It is safer to give diets into the small intestine, by passing a tube through a nostril by gastrostomy into the duodenum or by needle catheter jejunostomy or 12- or 14-French catheter jejunostomy.

**Administration-** For gastric feeding, first osmolality and then volume is increased, usually beginning with solutions that

are slightly hypo-osmolar. With iso-osmolar formulations, additional water is essential.

If administration is into the small bowel, volume is increased first, then osmolality. Most patients do not tolerate small bowel administration of greater than 500 to 600 mOsm.

Diets Available- There are a wide variety of enteral products. For patients with normal gut function, a less expensive commercial version of blenderised meal, a hydrolysate, is well tolerated. Patients in this category include those who cannot eat, such as the elderly, those with carcinoma of the head and neck, and those with neurologic disease.

Additionally, there are products with various degrees of complexity, ranging from oligopeptides to individual amino acids. The caloric supply varies from dextrose to complex starches.

Complex starches have solved a major problem in gut feeding-hyperosmolality. Modular diets are those in which the protein, fat, and carbohydrate components can be individually supplied.

With reasonably normal gut function, there appears to be no advantage of elemental diets over hydrolysates, except that elementa.

#### Enteral Feeding vs Parenteral Feeding

1. The enteral route is more physiologic-the liver is not bypassed and hepatic ability to take up, process, and store the various nutrients for later release on nervous or hormonal command is maintained.
2. Increased cardiac output is required when the gut is bypassed. With parenteral nutrition, gut blood flow increase about 15% to 20% presumably to allow the gut to perform its usual metabolic functions, such as transamination.
3. It is often said that enteral nutrition is safer and more efficacious than the parenteral route.
4. Recent studies in the trauma and burn settings have suggested improved outcome. The initial study indicating that there might be an advantage to survival with enteral feeding came from a study of burned children.

The study found that increasing the percentage of calories with whey protein from the standard 15% to 25% in severely burned children statistically improved survival. The children who survived with the increased amount of protein received a greater percentage of their feeding by gut as opposed to vein. Alexander and co-workers, in a classic series of investigations, subsequently provided evidence that gut feedings early in burns in guinea pigs and subsequently in man prevented, in part, the burn hypercatabolism.

The working hypothesis was that early gut feeding in man, prevented bacteria and/or their products from translocating the gut mucosa, releasing catecholamines and other counter regulatory stimuli, and thus prevented the hypercatabolism.

In posttraumatic situations, two prospective and randomized studies showed that early gut feedings result in

lower mortality and septic complication rates. Enteral nutrition is superior to parenteral nutrition with respect to outcome.<sup>7</sup>

#### Advantages of Enteral Feeding-

1. Enteral nutrition costs less;
2. It likely protects and improves hepatic function,
3. It mimics the normal ingress of nutrients so that the liver can store, process, and release nutrients as it normally does; and,
4. Gut mucosal integrity is maintained, particularly in burns and haemorrhagic shock. When mucosal integrity is maintained, particularly in burns and haemorrhagic shock. When mucosal integrity is not protected, increased translocation of bacteria or their products may occur, or at least decreased bacterial clearance occurs.

#### Mechanism-

1. Decreased translocation of bacteria and their products and improved mucosal barrier integrity.
2. Increased substrate supply to the liver and improved hepatic acute phase protein synthesis might be another mechanism by which outcome is improved.

#### RESULTS

Some patients receiving TPN may experience nausea, vomiting or excessive fullness. These symptoms can often be successfully management, avoiding the switch to parenteral nutrition.

It is not uncommon for patients being fed by a jejunal feeding tube to experience an increase in nausea and vomiting when EN is initiated. This may be due to a mechanism known as the "ileal brake".

If intact nutrients such as fatty acids escape absorption and reach the ileum, a negative feedback mechanism is triggered which, in turn, slows the stomach emptying of nutrients into the small bowel. This may result in nausea, vomiting, fullness, or an increase in gastric residual volumes. These symptoms are usually temporary and generally improve after a period of a few days to a few weeks. Patients with bacterial overgrowth may be at increased risk for this phenomenon.

Temporarily decreasing the EN flow rate with more aggressive antiemetic or prokinetic medications, or treatment of bacteria overgrowth with antibiotics may provide symptomatic relief.

#### CONCLUSION

1. Early enteral nutrition is the preferred route for the provision of nutrition support.
2. Enteral feeding within 24 hours<sup>7</sup> after gastrointestinal surgery is tolerated.
3. There is no benefit in keeping patients "nil by mouth" after gastrointestinal surgery.
4. Early enteral feeding improves tissue healing after gastrointestinal surgery.

5. Septic complications and length of hospital stay were reduced in those patients who received early enteral feeding.
6. In patients who received early enteral feeding there were no significant reductions in incidence of anastomotic dehiscence, wound infection, pneumonia and intra-abdominal abscess.
7. This study provides evidence to support the use of enteral feeding in surgical patients and indicate no increased morbidity or mortality.
8. This study form the basis of the current practice of the enteral feeding route being used wherever possible.
9. For early enteral nutrition to be effective, it must actually be received and tolerated by the patient.

#### REFERENCES

- [1] Velez JP, Lince LF, Restrepo JI. Early enteral nutrition in gastrointestinal surgery: a pilot study. *Nutrition* 1997;13(5):442-445.
- [2] Lewis SJ, Egger M, Sylvester PA, et al. Early enteral feeding versus nil by mouth after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. *BMJ* 2001;323(7316):773.
- [3] Lee SH, Jang JY, Kim HW, et al. Effects of early enteral nutrition on patients after emergency gastrointestinal surgery. *Medicine (Baltimore)* 2014;93(28):e323.
- [4] Charoenkwan K, Phillipson G, Vutyavanich T. Early versus delayed (traditional) oral fluids and food for reducing complications after major abdominal gynaecologic surgery. *Cochrane Database Syst Rev* 2007;(4):CD004508.
- [5] Moss G. The etiology and prevention of feeding intolerance paralytic ileus—revisiting an old concept. *Ann Surg Innov Res* 2009;3:3.
- [6] Ward N. Nutrition support to patients undergoing gastrointestinal surgery. *Nutr J* 2003;2:18.
- [7] Lewis SJ, Andersen HK, Thomas S. Early enteral nutrition within 24 h of intestinal surgery versus later commencement of feeding: a systematic review and meta-analysis. *J Gastrointest Surg* 2009;13(3):569-575.