

Does early enteral feeding delay the gastric emptying?- A prospective randomized controlled trial in post gastrojejunostomy patients

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Abstract

Introduction: Postoperative early enteral feeding has become a very common application in the present day surgical practice. Enteral nutrition has been found to increase the blood supply to the intestines, increase the gut secretions like hormones, various peptides and enzymes, which increases the gut motility and thereby enhances gastric emptying. **Materials & Methods:** This is prospective and observational study conducted at Tertiary care teaching hospital and research center over a period of 18 months were included in the study. Patients included in the study were those who underwent gastric bypass (Gastrojejunostomy) for gastric outlet obstruction either due to benign or malignant condition. **Results:** Total of 138 patients entered into the study, out of which 94 were excluded. The age of the patients ranged from 14 to 74 years with a mean (\pm SD) of 47.71(16.729) years in Early Feeding (EF) group and 44.95 (16.694) in No early Feeding (NEF) group. 15 patients were men and 9 were women in EF and 15 patients were men and 5 were women in NEF group. The Nasogastric tube was inserted for an average of 6.04 days in the Enteral feeding group and an average of 6.40 days in the No Enteral feeding group. **Conclusion:** Present study concludes that post operative enteral nutrition has no impact on DGE after gastric bypass and Ileal brake mechanism might not be clinically relevant. Most of patients who had enteral nutrition gained weight as compared to no Enteral feeding group.

Keywords: Gastric emptying, Gastrojejunostomy, Enteral feeding

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Introduction

Postoperative early enteral feeding has become a very common application in the present day surgical practice. Enteral nutrition has been found to increase the blood supply to the intestines, increase the gut secretions like hormones, various peptides and enzymes, which increases the gut motility and thereby enhances gastric emptying[1]. Early enteral nutrition has been proved to enhance the post operative recovery, decreases the septic complications by maintaining normal blood barrier, maintains the natural immunologic mechanism and protects against the bacterial translocation[2].

Delayed gastric emptying (DGE) is one of the most frequent postoperative complications after major upper gastro intestinal surgery, like Pancreaticoduodenectomy, Palliative Gastrojejunostomy or Truncal Vagotomy and gastrojejunostomy[3]. There are certain inhibitory mechanisms which are found to delay the gastric emptying known as "ileal brake". The role of enteral nutrition in the activation of this ileal brake and thereby delaying gastric emptying is not known[4].

In the present study we evaluated the role of enteral nutrition in the development of delayed gastric emptying after gastric bypass surgeries.

Materials & Methods

This is prospective and RCT study conducted at Tertiary care teaching hospital and research center over a period of 18 months were included in the study.

Inclusion Criteria

Patients included in the study were those who underwent,

1. Truncal Vagotomy & Gastrojejunostomy for chronic duodenal ulcer with gastric outlet obstruction
2. Palliative anterior / posterior gastrojejunostomy in locally advanced carcinoma stomach
3. As a part of Triple bypass in locally advanced periampullary carcinoma, Carcinoma Head of pancreas or duodenal carcinoma etc.

Exclusion Criteria

Patients excluded from the study were those who underwent:

1. Whipples Pancreaticoduodenectomy
2. Distal / subtotal gastrectomy in Carcinoma stomach
3. Whose pre op S. albumin < 3.0mg/dl

Patients were divided into 2 groups,

- Group A early feeding (EF), received early Enteral nutrition i.e. from 1st POD according to standard nutrition protocol.
- Group B no early feeding (NEF) received no early enteral nutrition.

All the patients were on both Nasogastric (NG) tubes (for gastric aspiration) & Nasojejunal (NJ) tubes (for feeding purpose) per operatively [Fig 2]. Randomization was done by closed envelop method immediately after surgery.

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Group A patients were started on NJ feed from

- 1st POD with 50ml/hr of special feeds of total 800ml/day with meeting 1000kcal/day,
- 2nd POD with 100ml/hr of total 1200ml/day with meeting 1400kcal/day and then
- 3rd POD with 150ml/hr with meeting total of 2400kcal/day

And continued the same till the naso gastric aspiration was less than 200ml/day & then removed & allowed to eat at will.

In group B, patients were not started with early feeds. Feeds were started later orally once the NG Aspiration became less than 200ml/day. The NasoGastric tube was removed on the respective postoperative day when the aspirate was less than 200 ml / 24 hours. The NasoGastric tube was reinserted if vomitus was of more than 300 ml on more than one occasion or patient had nausea or a feeling of fullness in the upper abdomen. Reinserted tubes were removed when

the aspirate was less than 200 ml / 24 hours. On the seventh postoperative day (7th POD), patients routinely received a oral gastrointestinal contrast study (gastrograffin)with water-soluble contrast medium to exclude leakage of the gastrointestinal anastomosis and to verify contiguity of upper gastrointestinal passage.

Statistical Analysis

Data was analyzed by Statistical Package for Social Sciences (SPSS) 13.0 version. Descriptive statistics was mean \pm SD. The comparison between two groups for continuous normal data was done by using t-test. The comparison between two groups for continuous non normal data was done by wilcoxon rank sum test. The comparison between two groups for categorical data was done by chi-square test. P-value less than 0.05 were statistically significant.

Results

Total of 138 patients entered into the study, out of which 94 were excluded.

Table 1: Age and Sex distribution in EF & NEF Group

Variables	EF group (n=24)	NEF group (n=20)	p-value
Age mean(SD)	47.71(16.729)	44.95(16.694)	0.589
Sex (male/female)	15/9	15/5	0.375

The age of the patients ranged from 14 to 74 years with a mean (\pm SD) of 47.71(16.729) years in Early Feeding (EF) group and 44.95 (16.694) in No early Feeding (NEF) group. 15 patients were men and 9 were women in EF and 15 patients were men and 5 were women in NEF group. [Table 1]

Table 2: Type of disease in EF & NEF group

DIAGNOSIS	EF group	NEF group	Total
Chronic Du with GOO + other diseases	16	15	31
Locally Advanced PAC / Ca HOP	3	1	4
Locally Advanced Ca Stomach with GOO	2	1	3
Disseminated Hilar cholangio Ca /Ca Duodenum with GOO with Cholangitis,	2		2
Corrosive antral stricture with GOO	1	1	2
Granulomatous gastritis with GOO		2	2
Total	24	20	44

The NasoGastric tube was inserted for an average of 6.04 days in the Enteral feeding group and an average of 6.40 days in the No Enteral feeding group (Table 2).

Table 3:Type of Surgery underwent in EF & NEF group

SURGERY	EF Group	NEF group	Total
TV+GJ + other surgeries*	15	18	33
Triple Bypass	3		3
Palliative Ant GJ	2	2	4
GJ+/- JJ + other surgeries*	3		3
Total	24	20	44

* Other surgeries include cholecystectomy, CBD Exploration, mesenteric LN biopsy, liver biopsy, excision of fistula, dismantling of FJ etc.

The various types of diseases and various types of operations performed are shown in Table 2 & 3. There is a relatively large group of patients who underwent a gastrojejunostomy with an accompanying Vagotomy (TV + GJ). In the 44 patients who underwent gastric bypass between February 2009 to July 2010 (18 months), hospital mortality was 2.09 % (1 of 44). One patient died on the 30th postoperative day with Aspiration Pneumonia. The mean postoperative hospital stay was 16.17 days (range 8-30) in EF group and 14.15 days (5-30) in NEF group. Delayed gastric emptying (DGE) occurred in 18 of 44 patients, 10 in EF group and 8 in NEF group. (p=0.911.) [Table 3]

Table 4:Co morbidities among EF & NEF Group

COMORBIDITIES	EF group	NEF Group	Total
HBs Ag / HCV positive	3		3
DM, Hypoproteemia	4	1	5
Old CVA, Right hemi paresis	1		1
COPD	1		1
Corrosive ingestion	1		1
Post mitral valvulotomy	1		1
HTN , (DM)		3	3
Crohn's disease,		1	1
Hypothyroidism		1	1
Previous recurrent typhoid fever		1	1
Allergy to penicillin		1	1
Nil	13	12	25
Total	24	20	44

Table 5: Different Variables among both EF & NEF Group in post op period

Variables	EF group (n=24)	NEF group (n=20)	p-value
DGE (yes/no)	10/14	8/12	0.911
RT/NJ Removal Mean(SD) – days	6.04(2.493)	6.40(3.885)	0.713
Re Insertion of RT(yes/no)	2/22	4/16	0.387
Need of NJ insertion through endoscopy(yes/no)	1/23	2/18	0.583
Need of prokinetics(yes/no)	5/19	7/13	0.293
Days-in patient mean(SD)	16.17(5.475)	14.15(6.293)	0.262
Re inserted NJ removal mean(SD)	1.25(6.124)	3.65(8.493)	0.118
Weight at admission mean(SD)	50.42(9.427)	49.85(8.641)	0.838
Weight at discharge mean(SD)	50.08(9.131)	47.75(9.043)	0.401
Stapled(h/s)	16/8	7/13	0.036

There was no difference in the frequency of delayed gastric emptying in patients with a Early Feeding group (10 of 24; 41.6%) or No Early Feeding group (8 of 20; 40%). [Table 5]

Table 6: Post Op complications in EF & NEF group

OTHER COMPLICATION	EF group	NEF group	Total
Hypoproteinemia, anemia	1		1
Wound infection	2	2	4
Cholangiolytic abscess	1		1
URTI	1		1
Aspiration pneumonia, recovered		1	1
Aspiration pneumonia, underwent tracheostomy		1	1
Nil	19	16	35
Total	24	20	44

Delayed gastric emptying occurred in (total 13 patients) 29.5% of the patients with Chronic Duodenal Ulcer with Gastric outlet obstruction patients compared to other diseases. [Fig 4]. 9 of 44 (20.45 %) patients developed other postoperative complications. [Table 6]

Table 7: Age & sex distribution among patients having DGE & No DGE

Variable	DGE Group (n=18)	No DGE group (n=26)	p-value
Age mean(SD)	46.61(16.578)	46.35(16.902)	0.959
Sex (male/female)	10/8	20/6	0.135

Discussion

Delayed Gastric Emptying (DGE) is the most common complication after gastric bypass and most of upper gastrointestinal surgeries[5]. However, the definition of a postoperative delay in gastric emptying varies and thus the incidence also varies. Causes for DGE are many, including pre operative factors like long standing obstruction and metabolic abnormalities to per operative tissue handling, disease per se etc, to post operative complications like gastric atony, stomal edema, stenosis, hypokelimia etc, Edematous swelling is probably the most common cause of early postoperative stenosis of the stoma[6]. In contrast, others have reasoned that mechanical causes should produce obstruction equally as often in the afferent stomal inlet as in the efferent outlet; however, afferent inlet dysfunction is unusual[7]. However, afferent limb peristalsis might overcome any edema at the anastomotic site. Such edema most often is not related to plasma colloidal oncotic pressure. No relationship was found in one study between delayed gastric emptying and postoperative serum protein values or colloidal osmotic pressure[8]. Although extreme forms of hypoproteinemia may be associated with anastomotic edema; such hypoproteinemia is rarely seen in patients undergoing operation. Use of an electrosurgical unit to divide the stomach and jejunum might be expected to cause greater edema, but their data does not support the contention that such a unit contributes to delayed emptying. What is interpreted as anastomotic edema is seen on virtually every upper gastrointestinal radiograph obtained in the immediate postoperative period. However, it is difficult to correlate the degree of apparent edema with delayed emptying of radiographic contrast material. Hence in our study we found hold up of contrast (stomal edema) as the common cause among the patients who has DGE. In our study, out of 18 patients having DGE, 5 had hold up of contrast (probably due to edema), rest 13 had normal flow of contrast. DGE was the most frequent complication after gastric bypass increasing hospital stay. (Mean 16.17 days). There was no significant difference in terms of age, sex of the patient in the occurrence of DGE in our study which is similar to the literature evidence. (Table 7)

There are a number of options available for administering nutritional supplementation. Parenteral nutrition (TPN) can be administered when the gastrointestinal tract is inaccessible, but this route is relatively expensive and it is associated with increased infectious complications[9]. Enteral nutrition has numerous potential advantages such as maintaining gut mass and absorption, limiting microbial translocation, fewer infectious complications, and reduced cost[10]. However, with gastro paresis, feeds must be administered directly to the jejunum. This is difficult to access if this complication has not been anticipated, especially given the major anatomic alterations secondary to Pancreatico Duodenectomy. Meta analysis of controlled trials on early Enteral feeding versus nil by mouth after gastrointestinal surgeries by Stephen J. Lewis yielded important principal findings. Firstly, there does not seem to be a clear advantage in keeping patients nil by mouth after elective gastro- intestinal resection. Secondly, in these patients early feeding may be beneficial[11]. Early Enteral feeding is being increasingly practiced in recent years as a concept of Fast track surgery, to tackle postoperative catabolism which can reduce occurrence of weight loss and improve the whole body protein kinetics and wound healing[12]. Enteral nutrition can reduce occurrence of weight loss under experimental conditions[13], hence in our study we found patients who had Enteral nutrition gained weight (up to 58% of patients, $p < 0.0001$) as compared to no Enteral feeding group, and compared with parenteral nutrition, it is less expensive and also a safer approach because septic complications due to longstanding indwelling central venous lines can be avoided[14]. Percutaneous tubes have advantages over naso gastric (NG) tubes, particularly if prolonged gastric decompression is required, as is often the case after pancreaticoduodenectomy[15]. Nasally placed tubes are uncomfortable, can be easily dislodged, and are associated with sinusitis, nasal trauma, gastro esophageal reflux, and respiratory complications[16]. These findings were extensively studied in post Whipples patients which were actually excluded in our study hence we used nasally placed tubes for feeding purpose and for aspiration of gastric contents. In a study from Marcus E. Martignoni et

al, on effect of enteral nutrition in post Whipple's patient, it becomes evident that postoperative enteral feeding prolongs the need for naso gastric intubation. A reduction in the amount of time spent daily on enteral feeding reduces the duration of naso gastric intubation, and withholding enteral nutrition altogether reduces intubation to a minimum. In their study, patients without Enteral feeding via a jejunal feeding tube had a naso gastric tube for an average of 4.0 days, whereas patients with Enteral feeding had a tube for an average of 11.1 days, where as our study showed no significant difference in both the groups (average 6-7 days in both the groups.) Most of our patients in the no Enteral feeding groups could start on adequate oral intake of liquid food on an average of 7 days as similar with study from David Fromm M.D et al[17]. Apart from the role the ileal brake plays in the regulation of gastrointestinal motor and secretory function, activation of the ileal brake leads to a reduction in hunger and in food intake. Activation occurs after exposure of the ileum to fat, carbohydrates and protein. Suggested mediators include PYY, GLP-1 and vagal nerve stimulation. The inhibitory effect of ileal brake activation on satiety has been repeatedly demonstrated, but it is uncertain whether this effect results from direct stimulation of central satiety centers in the brain, or if the ileal brake effect on hunger and satiety is achieved indirectly via the delay in gastric emptying. Present study concludes that post operative enteral nutrition has no impact on DGE after gastric bypass. Ileal brake mechanism might not be clinically relevant probably because of small sample size. Postoperative early enteral nutrition was suggested to surgeons as a way of improving the outcome of patients with major surgery of the gastrointestinal tract. The hypothesis is that early enteral nutrition prevents gut mucosal atrophy, which subsequently results in maintenance of the mucosal barrier and thereby protects against bacterial translocation. Several clinical studies have demonstrated that early postoperative Enteral nutrition can reduce septic complications and improve whole body protein kinetics and wound healing[18]. Enteral nutrition can reduce weight loss under experimental conditions, and as compared to parenteral nutrition, it is less expensive and also a safer approach because septic complications due to longstanding indwelling central venous lines can be avoided[27]. Most of our patients who had enteral nutrition gained weight as compared to no Enteral feeding group. (EF -58.3%, NEF - 5%; $p < 0.0001$) Gastroparesis is one of the most under diagnosed problems in cancer patients and often overlooked as a potential etiology of nausea and vomiting[19]. As many as 60 percent of patients treated for pancreatic cancer have symptoms of delayed gastric emptying[20]. In addition, these patients may also have a more generalized disorder of gastrointestinal motility, with components of dysphagia and abnormal small bowel motility (intestinal pseudo-obstruction, "functional ileus")[21]. The etiology is often multi factorial, and the contributing factors vary depending on the type of underlying cancer. Among the most important are paraneoplastic phenomena, direct tumor infiltration, past gastrointestinal surgery, and the toxic effects of chemotherapy and radiotherapy. Poorly controlled diabetes, hypothyroidism, other neuromuscular disorders, and use of medications that affect gastric emptying (particularly opioid) may also contribute[22]. In our study, patients undergoing bypass for chronic duodenal ulcer had a higher DGE rate than those who underwent surgery for malignancy, probably long standing outlet obstruction resulting in atony may be the cause for DGE in contrast to gastro paresis occurring in malignancy patients. Limitations of our study may be discomfort to patients with 2 tubes and probably of small sample size.

Conclusion

DGE was the most frequent complication after gastric bypass increasing hospital stay. Present study concludes that post operative enteral nutrition has no impact on DGE after gastric bypass and Ileal brake mechanism might not be clinically relevant. Most of patients who had enteral nutrition gained weight as compared to no Enteral feeding group. Patients undergoing bypass for chronic duodenal ulcer had a higher DGE rate than those who underwent surgery for malignancy.

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