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GI Cancers and Hepatobilliary Malignancies

Nasojejunal Feeding Is Safe and Effective Alternative to Feeding Jejunostomy for Postoperative Enteral Nutrition in Gastric Cancer Patients

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Abstract

Background and Aim Carcinoma of the stomach is one of the leading causes of mortality worldwide. Surgery for gastric cancer in the form of total or distal gastrectomy is definitive treatment. Feeding jejunostomy (FJ) though improves postoperative nutritional status and outcome, it is not devoid of its complications. In this study, we present the outcomes of nasojejunal (NJ) feeding and FJ and complications associated with them.

Materials and Methods It is both retrospective and prospective observational study in patients with gastric cancer undergoing surgery. Patients were divided into two groups: those who underwent FJ and those who underwent NJ route of feeding placed intraoperatively.

Results A total of 279 patients of gastric cancer who underwent surgery were taken into study, of which, 165 were male and 114 females. FJ was done in 42 and NJ in 237 patients, respectively. Gastrectomy + NJ was done in 128 patients, gastrectomy + FJ in 27 patients, gastrojejunostomy + NJ in 109 patients, and FJ in 15 patients. We had three patients of bile leaks in FJ group, of which one patient had intraperitoneal leak who needed re-exploration; rest of the two had peri-FJ external leaks, who were managed conservatively. Most of the complications of NJ group were minor.

Conclusion Our study of 279 patients in gastric cancer has shown that FJ is sometimes associated with major complications with increased hospital stay and morbidity when compared with NJ tube feeding without any difference in nutritional outcomes. Hence, NJ route of postoperative enteral nutrition can be considered as an alternative to FJ wherever feasible in view of its technical safety and minor complications and morbidity.

Keywords
- complications
- feeding jejunostomy
- gastric cancer
- nasojejunal feeding

Introduction

Impaired nutritional status after gastrectomy is associated with poor outcomes. Since its introduction by Busch in 1858, jejunostomy feeding as method of nutritional support has gained wide acceptance.[1]

Early postoperative feeding improves nutritional outcomes and hence overall morbidity and mortality.[2,3] A patient's postoperative nutritional status has also been demonstrated to be of great significance due to its impact on the tolerability of adjuvant treatments.[4]

Feeding jejunostomy (FJ) is associated with complications such as infections, peritubal bile leak, and even tube-associated mortality.[5] In this article, we present the outcomes of nasojejunal (NJ) feeding, FJ, and their complications.

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Materials and Methods

It is the retrospective and prospective observational study in patients with gastric cancer undergoing surgery. Patients were divided into two groups those who underwent FJ and those who underwent NJ route of feeding placed intraoperatively. NJ feeding was mostly practiced in our institute due to minimal complications associated with it.

The study was conducted in the Department of Surgical Oncology from 2013 to 2018. NJ tube and FJ was placed during primary surgery. NJ tube was placed during surgery in the efferent limb of jejunum either after gastrectomy or gastrojejunostomy. We use 14 or 16 French Ryle's tube that is guided nasally or orally just before closure of rent in anterior layer after reconstruction of gastrojejunostomy that is then retrieved under vision and Ryle's tube is then guided into efferent jejunal limb ensuring that there is no coiling or kinking of tube. As Ryle's tube is guided under vision and in view of its simplicity and safety, it is routinely practiced at our setup.

FJ was done by modified Whitzel's technique with 14 or 16 French Ryle's tube. Out of 42 FJ done, most of them were done by senior consultants. Less than 10% of cases were done by surgical oncology trainee under supervision.

Feeding was started on postoperative day 1 in both groups and increased progressively according to tolerability. NJ tube was removed once patient tolerated oral full liquid diet and FJ removed around 6 weeks postoperatively that corresponds to tract maturation.

Results

A total of 279 patients of gastric cancer who underwent surgery were taken in the study. Patients were divided into two groups: one group with patients of FJ and another group with NJ tube for feeding. Of which, 165 were male and 114 were female patients. The mean age of patients with NJ feeding was 57 years. The mean age of patients who underwent FJ was 52 years.

FJ was done in 42 patients and NJ tube was placed in 237 patients. Gastrectomy + NJ was done in 128 patients, gastrectomy + FJ in 27 patients, GJ + NJ in 109 patients, and FJ in 15 patients.

We had three patients of bile leaks, of which one patient had intraperitoneal leak who needed re-exploration Rest of the two peri-FJ external leaks were managed conservatively. FJ was also associated with complications like skin excoriation, intermittent clogging, dislodgement, and minor FJ site bleed. When FJ was associated with major complications there was need for total parenteral nutrition and hospital stay was prolonged as seen in ►**Table 1**.

Patients with NJ feeding had complications such as accidental pulling of tube, intermittent clogging, irritation of nasal area and throat, nasal skin ulceration, and displacement of tube. All the above complications were minor and conservatively managed (►**Table 2**).

Discussion

Gastric resections due to reduced functional capacity of the stomach, early satiety, and delay in oral intake compounded by its complications such as dumping syndrome are associated with malnutrition and patients are prone to consequences of malnutrition if adequate measures are not taken.[6,7]

Increased rate of infectious complications and mortality are seen due to reduced immunity, a consequence of malnutrition.[8] As these patients need adjuvant treatment in the form of chemotherapy and radiotherapy, it is essential that proper nutritional measures are taken as malnutrition is associated with complications and intolerability to adjuvant treatments.[9]

Many nutritional interventions have been developed to improve nutritional outcomes following surgery such as the early introduction of oral intake, total parenteral nutrition, NJ feeding, and FJ.[10]

Most of our patients underwent NJ route of feeding, as it was favored route of enteral nutrition in our institute when compared with FJ.

The mean age of patients with NJ feeding is 57 years. There was associated history of tobacco consumption in 68% of patients as smoking or other form and 53% of patients were alcoholic. Most of the patients had significant weight

Table 1 Complications with FJ

Complications	Number of patients (n = 42)
Intraperitoneal bile leak	1
Peri-FJ external bile leak	2
Peri-FJ skin excoriation	4
Peri-FJ infection	3
Minor FJ site bleed	1
Intermittent clogging	6
Dislodgement	1
Need for postoperative TPN administration	4
Need for refixation	3
Need for re-exploration for leak	1

Abbreviations: FJ, feeding jejunostomy; TPN, total parenteral nutrition.

Table 2 Complications with nasojejunal tube feeding (n = 237)

Complications	n
Accidental pulling of tube (%)	5
Intermittent clogging (%)	18
Mild irritation of nasal area and throat needing no intervention (%)	41
Nasal skin ulceration	2
Displacement (%)	7
Need for postoperative TPN (%)	9

Abbreviation: TPN, total parenteral nutrition.

loss due to inadequate oral intake and associated cancer cachexia. The mean hemoglobin was 9.8 g/dL, and preoperative transfusion was done wherever required for optimization (►**Table 3**). The mean age of patients who underwent FJ was 52 years with the history of consumption of tobacco and alcohol in 63 and 59%, respectively. The mean hemoglobin was 8.7 g/dL. Significant weight loss was seen in around 63% of patients (►**Table 4**).

A meta-analysis done by Shrikhande et al in October 2009 concluded that early postoperative enteral nutrition irrespective of route is considered superior to total parenteral nutrition. Enteral nutrition apart from reducing infectious complications was seen to be better to maintain stable metabolic activity.[11]

Dann et al and Patel et al observed that infectious complications were statistically significant in patients with jejunostomy tubes.[12,13] Patients had a longer hospital stay when compared with without jejunostomy.[12]

FJ is an effective route to improve postoperative nutritional status, but it is sometimes associated with major complications. We had three patients of bile leaks, of which one patient had intraperitoneal leak who needed re-exploration. Rest of the two peri-FJ external leaks was managed conservatively. In addition to bile leak, peri-FJ skin excoriation, intermittent clogging, dislodgement, minor FJ site bleed, need for total parenteral nutrition and prolonged hospital stay in patients who had major complications were seen with feeding jejunostomy (►**Table 1**).

Patients with NJ feeding had complications such as accidental pulling of tube, intermittent clogging, irritation of nasal area and throat, nasal skin ulceration, and displacement of tube as seen in ►**Table 2**. All the above complications were minor and conservatively managed.

Analysis of data of ►**Tables 1** and **2** shows that patients who underwent FJ had higher rate of major complications which sometimes needed intervention even in the form of re-exploration, whereas complications associated with NJ tube were minor and most were conservatively managed. Moreover, patients with FJ who had complications had prolonged hospital stay with increased use of resources and increasing cost burden to patients and family.

Although statistical analysis of confounding factors has not been done in this study, the clinical characteristics of patients such as patient's nutritional profile and associated risk factors spectrum were more or less similar between both groups of patients as seen in ►**Tables 3** and **4**. Most of our patients presented with poor nutritional profile and with significant weight loss. Here, we compared FJ that is a surgical technique to simple placement of Ryle's tube for feeding, both of which were done during surgery for nutritional supplement. Although FJ and NJ have their pros and cons, NJ route of nutritional supplement was noninferior to FJ for postoperative nutritional supplementation in our study with less morbidity and minor complications. When major complications occurred after FJ, there was increase in morbidity with prolonged hospital stay and consequent increase in utilization of hospital resources and increased financial burden to patients.

Table 3 Characteristics of patients with nasojejunal feeding

Characteristics of patients	Percentage/number
Mean age	57
Diabetes mellitus (%)	13
Hypertension	15
Mean hemoglobin at presentation	9.8 (g/dL)
Mean albumin at presentation	3.2 (g/dL)
History of tobacco consumption (%)	68
History of alcohol intake (%)	53
Significant weight loss (%)	69

Table 4 Characteristics of patients with feeding jejunostomy

Characteristics of patients	Percentage/number
Mean age	52
Diabetes mellitus (%)	11
Hypertension (%)	17
Mean hemoglobin at presentation	8.7 (g/dL)
Mean albumin at presentation	3 (g/dL)
History of tobacco consumption (%)	63
History of alcohol intake (%)	59
Significant weight loss (%)	63

As we used 14 or 16 French Ryle's tube, there was no issue of availability.

We never found difficulty in insertion; it is very simple procedure followed in our institute. Ryle's tube was passed orally or nasally by anesthetist or surgical oncology resident that was just like simple Ryle's tube insertion; once it reaches stomach, it can be visualized easily and guided into efferent limb of jejunum before closing anterior layer of gastrojejunostomy.

NJ placement is easiest and safe technique, and this procedure does not take more than even 5 minutes. Once Ryle's tube is guided into the efferent limb anterior layer is closed. Placement of NJ was faster and even cost-effective as it needs only simple Ryle's tube as done in our study. The average time taken for FJ is more when compared with NJ placement.

Although there was blockage of Ryle's tube in few cases, most of the blockages could be managed conservatively by flushing with normal saline or sodium bicarbonate solution. Few cases in which there was spontaneous expulsion of tube were managed conservatively as most of patients tolerated oral diet by that time, so it was never a major problem in the management of our patients as patients tolerated oral diet by that time.

NJ tube was removed on an average of postoperative day 3 after oral feeds were tolerated and FJ tube was removed around 6 weeks postoperatively corresponding to tract maturation. In addition, removal of FJ sometimes was difficult in view of kinking of tube. We never had problems in cases

of spontaneous expulsion of NJ tube as by that time most of the patients tolerated oral diet, so it was conservatively managed, and hence spontaneous expulsion of tube was never a problem in postoperative period and nutrition supplementation during adjuvant therapy.

Abu-Hilal et al concluded that NJ feeding is safe to use in view of its relatively less complications.[14]

US gastric cancer collaborative database study observed that there were higher infectious complications rates, though there was no evidence of any major complications.[12]

Sun et al utilizing the American College of Surgeons National Surgical Improvement Project database observed that there were no major differences in rates of infection, mortality, and morbidity in FJ versus non-FJ patients.[15]

Conclusion

Our study of 279 patients in gastric cancer has shown that FJ is sometimes associated with major complications, with increased hospital stay and morbidity when compared with NJ tube feeding without any difference in nutritional outcomes. Both the procedures have their pros and cons and are equally effective routes of postoperative nutrition. NJ route is the easiest technique, relatively safe, noninferior to FJ for nutritional supplementation, and less time taking with minor complications. Hence, NJ route of postoperative enteral nutrition can be considered as an alternative to FJ wherever feasible in view of its technical safety and minor complications and morbidity.

Funding
Nil.

Conflicts of Interest
There are no conflicts of interest.

References

1 Gerndt SJ, Orringer MB. Tube jejunostomy as an adjunct to esophagectomy. Surgery 1994;115(2):164–169
2 Vaithiswaran V, Srinivasan K, Kadambari D. Effect of early enteral feeding after upper gastrointestinal surgery. Trop Gastroenterol 2008;29(2):91–94
3 Osland EJ, Memon MA. Early postoperative feeding in resectional gastrointestinal surgical cancer patients. World J Gastrointest Oncol 2010;2(4):187–191
4 Cunningham D, Allum WH, Stenning SP, et al; MAGIC Trial Participants. Perioperative chemotherapy versus surgery alone for resectable gastroesophageal cancer. N Engl J Med 2006;355(1):11–20
5 Weijs TJ, Berkelmans GH, Nieuwenhuijzen GA, et al. Routes for early enteral nutrition after esophagectomy. A systematic review. Clin Nutr 2015;34(1):1–6
6 Cidon EU. Nutritional status after total gastrectomy for gastric cancer. World J Oncol 2010;1(2):87–90
7 Papini-Berto SJ, Burini RC. [Causes of malnutrition in post-gastrectomy patient]. Arq Gastroenterol 2001;38(4):272–275
8 Giner M, Laviano A, Meguid MM, Gleason JR. In 1995 a correlation between malnutrition and poor outcome in critically ill patients still exists. Nutrition 1996;12(1):23–29
9 Mezhir JJ, Tang LH, Coit DG. Neoadjuvant therapy of locally advanced gastric cancer. J Surg Oncol 2010;101(4):305–314
10 Baker A, Wooten LA, Malloy M. Nutritional considerations after gastrectomy and esophagectomy for malignancy. Curr Treat Options Oncol 2011;12(1):85–95
11 Shrikhande SV, Shetty GS, Singh K, Ingle S. Is early feeding after major gastrointestinal surgery a fashion or an advance? Evidence-based review of literature. J Cancer Res Ther 2009;5(4):232–239
12 Dann GC, Squires MH II, Postlewait LM, et al. An assessment of feeding jejunostomy tube placement at the time of resection for gastric adenocarcinoma: a seven-institution analysis of 837 patients from the U.S. gastric cancer collaborative. J Surg Oncol 2015;112(2):195–202
13 Patel SH, Kooby DA, Staley CA III, Maithel SK. An assessment of feeding jejunostomy tube placement at the time of resection for gastric adenocarcinoma. J Surg Oncol 2013;107(7):728–734
14 Abu-Hilal M, Hemandas AK, McPhail M, et al. A comparative analysis of safety and efficacy of different methods of tube placement for enteral feeding following major pancreatic resection. A non-randomized study. JOP 2010;11(1):8–13
15 Sun Z, Shenoi MM, Nussbaum DP, et al. Feeding jejunostomy tube placement during resection of gastric cancers. J Surg Res 2016;200(1):189–194