

## Nasojejunal feeding versus feeding jejunostomy after upper gastrointestinal surgery

M. Ranjithatharsini, K.I. Deen, S.K. Kumarage, C.A.H. Liyanage, R.C. Siriwardana, B. Gunathilake  
Professorial Unit, Department of Surgery, Colombo North Teaching Hospital, Sri Lanka.

**Key words:** Nasojejunal feeding; jejunostomy; nutrition

### Abstract

### Introduction

The use of enteral nutrition over parenteral nutrition is recommended in the case of patients undergoing major gastrointestinal surgery for cancer, as it reduces sepsis related morbidity. In this study we compared our experience of nasojejunal tube feeding with feeding jejunostomy.

### Materials and Method

All patients who underwent elective upper gastrointestinal surgery in our unit (North Colombo Teaching Hospital) from October 2011 to October 2012 were studied. Data gathered included; type of surgery, operative factors, preoperative nutritional level, type of feeding, complications and period of hospital stay.

### Results

Twenty patients, median age 53yrs;range (32 – 72), fifteen male and five female, comprised of ten patients in the feeding jejunostomy group and ten in the nasojejunal feeding group. Both groups were comparable for age, gender, body mass index, preoperative serum albumin level, type of surgery and operation time. Mortality of 40 percent was attributed to aspiration in those with a feeding jejunostomy compared with no aspiration after nasojejunal feeding. Some 60 percent of feeding jejunostomy tubes were in-situ in patients at the time of hospital discharge versus none in the naso-jejunal group. Surgery complications, such as chest infection were comparable in both groups. However, entero-cutaneous leakage occurred in 30percent, and was a considerable management burden

Correspondence: M.Ranjithatharsini  
E-mail: mranjitha81@gmail.com

in the feeding jejunostomy group.

### Conclusion

In upper gastrointestinal surgery nasojejunal tube feeding seems better than feeding jejunostomy.

### Introduction

Traditionally, in the critically ill patient, nutrition is provided through enteral as well as parenteral routes. The current guidelines of the European Society for Parenteral and Enteral Nutrition (ESPEN) and American Society of Parenteral and Enteral nutrition (ASPEN) recommend use of enteral nutrition over parenteral nutrition in the case of patients undergoing major gastrointestinal surgery for cancer, as it is known to reduce septic morbidity rates [1,2]. Enteral nutrition may be provided as oral supplements in the form of drink supplements after upper gastrointestinal surgery via an enteral tube into the stomach or small bowel. There are different methods of enteral tube feeding; enteral feeding is usually by nasoenteric or enterostomy tubes [2,3]. In this study we assessed whether nasojejunal tube placement is superior to feeding jejunostomy.

### Methods

Twenty patients comprised ten patients in the feeding jejunostomy group and ten in the nasojejunal feeding group. The median age for feeding jejunostomy patients was 53 years (32–72) and for nasojejunal tube feeding patients was 56 years (32–67). A comparison of groups did not show a difference between the feeding jejunostomy and naso-jejunal feeding group (table 1).

### Route of feeding

For nasojejunal feeding, we introduced a flexible 14 Ch feeding tube through the nose which was positioned in the jejunum at the time of operation. In feeding

**Table 1: Comparison of patients in jejunostomy feeding and nasojejunal feeding groups.**

	Jejunostomy feeding	Nasojejunal feeding
Age- median(range)	53years (32 - 72)	56 years (32 -67)
Gender Female:Male	2:8	3:7
Body Mass Index	17.77kgm <sup>-2</sup> (SD+2.924)	18.252kgm <sup>-2</sup> (SD+3.195) correlation bivariate test p value 0.810
Pre-operative serum albumin	3.51g/dl (SD+0.655)	3.41g/dl (SD+0.63) p value 0.697
Pre-operative morbidity	Number	Number
1. Diabetes Mellitus	2	3
2. Hypertension	2	1
3. Chronic liver cell disease	1	0
4. Hypercholesterolemia	0	1
5.Hyperthyroidism	1	0
6. Hypothyroidism	1	0

jejunostomy, a 14F catheter was placed trans-abdominally into the jejunum during at the end of the procedure as previously described [3]. Both tubes were stabilized - nasojejunal tube at the nostril and feeding jejunostomy catheter at the anterior abdominal wall-with a 3/0 silk suture. The choice of feeding route was based on individual surgeon's preference.

#### Data collection and analysis

Data were collected using a questionnaire. The type of surgery, operative factors affecting outcome, pre-operative nutritional level, pre-operative morbidity, type of feeding and its complications, post-operative morbidity, mortality and period of hospital stay were gathered prospectively during daily patient visits. Primary endpoints were the time to removal of the tube and tube related complications. Secondary end points were complications of tube feeding, surgical morbidity, mortality and length of hospital stay.

#### Inclusion and Exclusion criteria

All elective upper gastrointestinal surgical procedures

in our unit, between October 2011 and October 2012, were studied. Inclusion criteria were; those having oesophagectomy, total and partial gastrectomy, gastrojejunostomy, Whipple's pancreatoduodenectomy and palliative triple bypass for inoperable pancreatic cancer. Those excluded were; patients with nasojejunal tubes which were already in place pre-operatively. There were no interventions or deviations from the normal management during this study process.

Collected data were documented in excel sheets and data analysis was performed using the Statistical Package for Social Studies (SPSS version 21.0.0, New York, USA). Data were expressed as either median and range or mean and standard deviation. The test of significance used was a Pearson correlation test. Significance was assigned to a P value of <0.05.

#### Results

Of twenty two patients available for the study during this period, two were excluded because they had

nasojejunal feeding tubes before operation. Operation time differed according to the type of surgery. Insertion of a nasojejunal tube did not add time to operation time but feeding jejunostomy creation added, on average, 15 to 20 min to the operation. Mean operating time for the feeding jejunostomy group was 4.14hrs (+1.34) and nasojejunal feeding group was 5.0hrs (+1.80), which was not significantly different (P = 0.112 ; Pearson's test.)

#### Indications and type of surgery

Details of surgical procedures are shown in table 2. Most of the oesophagectomy and total gastrectomy patients had a feeding jejunostomy while those having partial gastrectomy and gastrojejunal anastomosis had a nasojejunal feeding tube. Nearly equal proportions of patients who underwent pancreatico-duodenectomy had jejunostomy and nasojejunal feeding tubes.

#### Mortality

Four(40 percent) in the feeding jejunostomy group died due to pulmonary aspiration complicating feeding jejunostomy and one (10 percent) died in the nasojejunal feeding group, which was due to disseminated cholangiocarcinoma with obstructive jaundice and multiorgan failure.

#### Time to removal of the tube

Details of the time from placement to removal of the tube are shown in table 3. In the feeding jejunostomy group, 60% of the patients were discharged from

hospital with the tube in place and 20% of the tubes were removed after 14 days. The remaining 20% were removed between 10 -14 days. In the nasojejunal feeding group, 60% of the tubes were removed within 10 days of placement.

#### Complications of tube feeding

Complications that occurred from tube feeding are shown in table 4. In the feeding jejunostomy group, 40% had aspiration pneumonia, 30% had intestinal colics and complications as severe as intra-abdominal abscess formation and peritonitis were found in 20%. Mortality (40%) also found due to these complications. In the nasojejunal feeding group, 50% had nasal tube associated rhino-pharyngitis, 40% had poor compliance and 10% had aspiration pneumonia, resulting in a total complication rate of 100% (including minor tolerable complications) for nasojejunal feeding versus 80% for jejunostomy feeding.

#### Time to commence feeds

In both groups, time to start feeding after surgery differed according to the patient's condition. Details are shown in table 5. In 80 percent of feeding jejunostomy patients, feeding commenced on the first post-operative day whereas, in the nasojejunal feeding group, feeding commenced between the first and third post-operative day in 60 percent of patients. Feeding through the jejunostomy was discontinued in the third to fourth post operative day due to complications (aspiration pneumonia, intestinal colic, abdominal distention,

**Table 2: Indications and type of surgery in both groups**

Indications for surgery	Feeding jejunostomy	Nasojejunal feeding	Type of surgery	Feeding jejunostomy	Nasojejunal feeding
Circumferential duodenal growth	2(20)	1(10)	Oesophagectomy	2(20)	1(10)
Gastric antral tumour	5(50)	3(30)	Total gastrectomy	4(40)	0
GIST(Gastrointestinal stromal tumour)	1 (10)	0	Total gastrectomy +distal oesophagectomy	1(10)	0
Cystic lesion in the head of pancreas	1(10)	1(10)	Total gastrectomy (abandoned)	1(10)	0
Oesophageal carcinoma	2 (20)	1 (10)	Gastrojejunostomy	0	1(10)
Duodenal tumor with peritoneal and liver metastasis		1(10)	Palliative gastrojejunostomy	0	1(10)
Locally advanced cholangio carcinoma		1(10)	Palliative partial gastrectomy	0	3(30)
Periampullary carcinoma		1(10)	Partial gastrectomy Roux en Y	0	1(10)
Pyloric stricture		1(10)	Whipple's pancreato duodenectomy	2(20)	3(30)

**Table 3 : Tube removal time in feeding jejunostomy group and nasojejunal feeding group.**

Time of the tube removal	Feeding jejunostomy	Nasojejunal feeding
Not removed at time of discharge	6(60)	1(10)
Removed within 5 days	0	1(10)
Removed between 5 -9 days	0	5(50)
Removed between 10 -14 days	2(20)	2(20)
Removed after 14 days	2(20)	1(10)

**Table 4: Complications of tube feeding \***

Feeding jejunostomy	Frequency	Nasojejunal feeding	Frequency
Aspiration pneumonia	4	Compliance	4
Intestinal colic	3	Rhino pharyngitis	5
Water and electrolyte imbalance	2	Aspiration pneumonia	1
abdominal distension	1	Water and electrolyte imbalance	3
Cutaneous and intra -abdominal abscess, peritonitis	2	Diarrhea and vomiting	2
Cutaneous and intra-abdominal leakage	1		
Obstruction and dislodgement	1		
No complications	2	No complication	0

\*Some had more than one complication

abscess and peritonitis, obstruction and dislodgement – table 4). Because of the complications of feeding jejunostomy, oral feeding was omitted in one half of feeding jejunostomy patients compared with nasojejunal feeding, where all patients continued to be fed without complication.

#### Length of hospital stay

A majority of patients having feeding jejunostomy stayed in hospital for median of 14 days (10 to 30 days). In the nasojejunal feeding group median hospital stay was 9 days (3 to 60 days). Only one patient stayed in hospital for 60 days due to the disseminated disease. Hospital stay was significantly affected ( $p=0.02$ ) by the mode of feeding.

#### Overall complication rate

Table 6 shows the complications, overall, in the feeding jejunostomy and nasojejunal feeding groups. In the feeding jejunostomy group 70 percent of the patients had chest infections, 30 percent had anastomotic leaks and 10 percent were free of complications. In the nasojejunal feeding group 70 percent had chest infections, 10 percent had anastomotic leaks and 20 percent remained free of complications.

#### Discussion

In this study we compared our experience of nasojejunal tube feeding with feeding jejunostomy after upper gastrointestinal surgery. Both groups were compared

according to patient factors, preoperative nutritional level, surgical factors, tube related factors and post-operative morbidity and mortality.

Regarding the common factors, age and gender were not significant in tube feeding outcomes. Malnutrition in patients with cancer has been shown to increase the risk of postoperative complications [4]. In our study both groups had a comparable mean body mass index and serum albumin level.

The primary endpoints in this study were time to removal of the tube and tube related complications. The secondary end points were complications of tube feeding, morbidity, mortality and length of hospital stay. Those fed through a nasojejunal tube received feeds for a short period (7 to 9 days) and most (60 percent) were removed within nine days. By contrast, the majority of feeding jejunostomy patients (80 percent) had their feeding omitted some days after early commencement due to complications that resulted from the tube. Feeding jejunostomy tubes were in place for more than two weeks and most (60 percent) were not removed at the time of hospital discharge. Thus, compared to the feeding jejunostomy group, nasojejunal tube feeding patients were able to have continuous feeding without severe complications.

Review of the literature is supportive of our findings, for example Gerritsen et al showed that feeding jejunostomy patients had greater complications versus nasojejunal feeding patients [5]. In this study we found

**Table 5: Time to initial feeding and oral feeding in feeding jejunostomy and nasojejunal feeding groups**

Tube feeding time	Feeding jejunostomy (number)	Nasojejunal feeding (number)
Post op D1	8	2
D2	1	1
D3	1	3
D4	0	1
After D5	0	2
Not given	0	1
Time of oral feeding	Feeding jejunostomy (number)	Nasojejunal feeding (number)
within 5days	2	4
5 -9days	7	2
10 -14 days	0	1
> 14days	0	2
not given	1	1

**Table 6 : Frequency of surgical complications in feeding jejunostomy group and nasojejunal feeding group. (Figures in parentheses represent percentage value)**

Feeding jejunostomy group	Frequency	Nasojejunal feeding group	frequency
Chest infection	7 (70)	Chest infection	7 (70)
Anastomotic leakage	3 (30)	Anastomotic leakage	1 (10)
Haemothorax and hypoxic brain damage	1 (10)	Wound infection	1 (10)
Post operative ileus	1 (10)	Post vagotomy diarrhoea	1 (10)
No complications	1 (10)	Urinary tract infection	1 (10)
		No complications	2 (20)

that after feeding jejunostomy, patients had aspiration pneumonia which led to mortality. Other severe complications were cutaneous and intra-abdominal leakage, peritonitis and intra-abdominal abscess formation. By contrast, complications such as rhino pharyngitis and intolerance of the tube following nasojejunal feeding were better tolerated. Thus, the nasojejunal feeding tube seemed better than the feeding jejunostomy at least in the short term.

Regarding mortality, feeding jejunostomy patients had 40 percent mortality versus 10 percent in the nasojejunal feeding group. In the former, the mortality was due to complications of feeding jejunostomy but in the latter mortality was due to disseminated cancer. Furthermore, the length of hospital stay was reduced in the nasojejunal feeding group compared with feeding jejunostomy group, which, we believe, was due to better patient tolerance, minor complications and early tube removal.

Postoperative chest infections were the most common complication in both groups. In addition, feeding jejunostomy patients had a greater anastomotic leakage where feeding jejunostomy was not a cause for anastomotic leakage, a factor that may have been better controlled if we undertook a randomized study to

stratify for factors that influenced anastomotic leakage and surgical procedure. Also, the result of the study may have been improved by evaluation of a greater sample size and, perhaps, performing a multi-centre trial.

In conclusion, after upper gastrointestinal surgery, patients having nasojejunal feeding seemed to fare better than those having a feeding jejunostomy based on continuity and duration of feeding, time to tube removal, tube related morbidity and mortality and, ultimately, length of hospital stay.

#### References

1. Weimann A, Braga M, Harsanyi L, Laviano A, Ljungqvist O, Soeters P, et al. ESPEN Guidelines on enteral nutrition: surgery including organ transplantation. Clin Nutr. 2006;25(2):224–44. doi: 10.1016/j.clnu.2006.01.015.
2. Moore FA, Feliciano DV. Early enteral feeding, compared with parenteral, reduces postoperative septic complications. Ann Surg. 1992 August; 216(2): 172–183.
3. Pearce CB, Duncan HD. Enteral feeding. Nasogastric, nasojejunal, percutaneous endoscopic gastrostomy, or jejunostomy: its indications and limitations. Postgrad Med J 2002;78:198-204 doi:10.1136/pmj.78.918.198

4. McWhirter JP, Pennington CR. Incidence and recognition of malnutrition in hospital. *BMJ* 1994;308: 945–8.

5. Arja Gerritsen, Marc G. Besselink, Kasia P. Cieslak, Menno R. Vriens, Elles Steenhagen, Richard van Hillegersberg, Inne

H. Borel Rinkes, I. Quintus Molenaar. Efficacy and Complications of Nasojejunal, Jejunostomy and Parenteral Feeding After Pancreaticoduodenectomy. *J Gastrointest Surg* 2012; 16:1144–1151.