International Surgery Journal
Sunny A et al. Int Surg J. 2018 Oct;5(10):3282-3287
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20184075

Original Research Article

A prospective descriptive study to evaluate the impact of percutaneous endoscopic gastrostomy in patients who require nutritional support

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Received: 06 August 2018
Accepted: 17 September 2018

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ABSTRACT

Background: Patients who are unable to consume orally often require some form of nutritional support. Enteral is always better than the parenteral route. Enteral feeds via traditional nasogastric tube or nasojejunal route have been used for short term feeding but for long term management of these patients percutaneous endoscopic gastrostomy is a better option. It does not require an operating room and has less morbidity associated with it.
Methods: We did a prospective descriptive study to look at the role of percutaneous endoscopic gastrostomy (PEG) in providing nutritional support to patients and the morbidity associated with this procedure.
Results: In this study, 83% of the patients needed PEG for head and neck cancers prior to radiotherapy and chemotherapy. Most of our patients had no complications due to the procedure (70%). There was only one major complication of necrotizing fasciitis, the rest were all minor complications. The nutritional parameters checked at the beginning and at the end of the study were not statistically significant, for example weight, serum albumin and hemoglobin but all these parameters of the study patients were stable.
Conclusions: Authors found that long-term enteral feeding via PEG is a safe, effective, easy-to-apply, and highly acceptable method with minimal complications.

Keywords: Enteral nutrition, Percutaneous endoscopic gastrostomy (PEG)

INTRODUCTION

Patients unable to consume necessary nutrients orally require alternative form of nutritional support. Nutritional supplements are essential in patients who have lost more than 10% of their body weight in the preceding 6 months or 5 % in the preceding month to diagnosis. Enteral nutrition is the preferred route for delivery since it has several advantages compared to parenteral nutrition.

Techniques available for enteral feeding include conventional nasogastric feeding tube, fine bore feeding tubes into the stomach via an open or endoscopic percutaneous tube placement or post pyloric tube placements via nasojejunal or jejunostomies. A nasogastric tube usually suffices for short term feeding. Due to its complications like laryngeal irritation, gastroesopahgeal reflux, high risk aspiration, nasal alar ulceration, inadvertent removal, blockage and poor compliance it is not very popular for long term feeding.

Tube eneterostomies obviate the difficulties associated with nasogastric tube feeding. Traditional open surgical techniques like Stamm's and Janeway require an operating room and are associated with higher costs and wound related morbidity rate.

Percutaneous endoscopic gastrostomy (PEG) is an endoscopic procedure by which a tube (PEG Tube) is

passed into the patient's stomach through the anterior abdominal wall for enteral nutrition. This is associated with less morbidity and are more acceptable among patients and care givers.

The first percutaneous endoscopic gastrostomy was performed on a child on June 12, 1979 at the Rainbow Babies and Children's Hosital, University Hospitals of Cleveland by Dr. Michael WL Gauderer, pediatric surgeon, Dr. Jeffrey Ponsky, endoscopist, and Dr. James Bekeny.[1] This procedure was performed on a four-and-one-half month-old child with inadequate oral intake. The authors of the technique first published this in 1980.

It wasn't until 2001, the details of the development of the procedure were published. Peg was soon popular as it was able to provide enteral nutrition to wide variety of patients, for example – patients with impaired swallowing associated with neurological and neoplastic diseases of oropharynx, larynx and the oesophagus. Less commonly PEG is placed for patients with head and fascial trauma and in those with miscellaneous catabolic conditions who require supplement feeding. Peg may also be useful to attain chronic gastric decompression in selected patients with benign or malignant causes of gastrointestinal obstruction.[2,3] This is referred as venting PEG.

In the present study, we looked at percutaneous endoscopic feeding tube placement for enteral feeding in patients. The objective of present study was look at the morbidity of the procedure and the nutritional benefits in patients who underwent percutaneous endoscopic gastrostomy. We also wanted to look at the feasibility and cost of this procedure in a small secondary care hospital like ours.

METHODS

For this purpose, we conducted a prospective descriptive study with consecutive sampling. This study was conducted over a period of one year and four months in Bangalore Baptist Hospital. (August 2010 to December 2011)

All patients who fulfilled the following inclusion criteria were included-

- Patients with an intact functional gastrointestinal tract who are unable to consume sufficient calories to meet metabolic needs.
- Impaired swallowing associated with neurological and neoplastic diseases of the oropharynx, larynx and the esophagus.
- PEG was placed for patients with head and facial trauma who require supplement feeding.

Exclusion Criteria

Patients who couldn't undergo PEG placement due to:

- Gastrointestinal tract obstruction
- Uncorrectable coagulopathy
- History of prior gastric resection, ascites, obesity, hepatomegaly which may impede gastric transillumination and subsequent PEG placement.
- Contraindications for an upper gastrointestinal endoscopy
- Inflammatory and infiltrative diseases of the gastric and the abdominal walls.

Required for percutaneous endoscopic gastrostomy

- Endoscopy suite
- PEG Set
- Local Anesthesia
- Disposable syringes

After informed consent was obtained from the patient or the care giver. In present study the feeding tube was placed by the pull technique (Gauderer–Ponsky tecnique). The procedure generally requires two people; one trained surgeon in endoscopy and PEG procedure and an assistant. 30 mins prior to the procedure one dose of parenteral antibiotic was given, in present study we used first generation cephalosporin.

Step 1: This involves performing a gastroscopy to evaluate the anatomy of the stomach.

Step 2: The anterior abdominal wall is identified and its ensured that there is no organ between the wall and the skin. Digital pressure is applied to the anterior abdominal wall, which is seen indenting the anterior gastric wall by the endoscopist.

Step 3: Transillumination (diaphanoscopy): the light emitted from the endoscope within the stomach wall can be seen through the anterior abdominal wall, after which (21G, 40 mm) needle is passed into the stomach before the larger cannula is passed.

Step 4: An angiocath is then used to puncture the anterior abdominal wall through a small incision and a soft guide wire is inserted through this and pulled out of the mouth.

Step 5: The feeding tube is then attached to the guide wire and pulled through the mouth, oesophagus, stomach, and out of the incision.

That would conclude the procedure. All the patients were admitted for 24 hours to the hospital post procedure. The reason for this stay was to educate the patient and the caregivers about feeding and monitor the patient post procedure.

All patients were followed up after a two months period in our outpatient service. We had a total of 30 patients in present study.

Descriptive statistical analysis was carried out in the present study. Results on continuous measurements are presented on Mean □ SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made, Assumptions: 1 Dependent variable should be normally distributed, 2 Samples drawn from the population should be random, Cases of the samples should be independent. Student t test (two tailed, dependent) has been used to find the significance of study parameters on continuous scale with in each group. Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more group. The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS

Table 1 suggests that the maximum number of patients who required a feeding tube placement belonged to the age group of 51-60 years.

Table 1: Age distribution of patients studied.

Age in years	No. of patients	%
35-40	4	13.3
41-50	6	20.0
51-60	13	43.3
61-70	6	20.0
>70	1	3.3
Total	30	100.0

Table 2 suggests that there was a male predominance in placement of PEG tubes.

Table 3 elaborates the above table for each patient. We had 83.3 % patients who were diagnosed to have Head and Neck cancers and required the PEG tubes prior to radiotherapy and chemotherapy.

Table 2: Gender distribution of patients studied.

Gender	No. of patients	%
Male	25	83.3
Female	5	16.7
Total	30	100.0

In present study we had one patient (3.3%) with swallowing disorder who underwent PEG tube placement vs a surgical intervention since he was 90 years old and had previous history of stroke and myocardial infraction. He also had history of hypertension and diabetes. He was a very high-risk surgical candidate and he care givers were not willing for a surgical intervention for him. Hence PEG was offered to the patient and caregivers as a route for feeding.

We had two patients (6.7%) with history of severe trauma to the face and head who were feed via the PEG tubes.

Table 3: diagnosis and reasons for percutaneous endoscopic feeding tube placements in the patients studied.

Diagnosis	No. of patients	%
Head & Neck cancer	25	83.3
Neurological dysphagia	1	3.3
Stroke	1	3.3
Swallowing disorder	1	3.3
Trauma	2	6.7
Total	30	100.0

As per this table 5 most of our patients had normal upper gastroinstestinal endoscopy prior to PEG placement (86.7 %), only 4 patients had abnormal scopies (13.3%), out of which only one could possibly interfere with the PEG placement.

Table 4: Upper GI endoscopy at the time of PEG.

UGI scopy	No. of patients n=30	%
Normal	26	86.7
Abnormal	4	13.3
Pan gastritis and upper oesophageal resistance	1	3.3
Pan gastritis	1	3.3
Duodenitis with antral gastritis	1	3.3
Exophytic growth in the circopharynx	1	3.3

As seen in this table most of our patients didn't have co-morbidities.

Table 5: Co-morbid conditions of patients studied.

Comorbid conditions	No. of patients n=30	%
Absent	20	66.7
Present	10	33.3
DM	1	3.3
HTN	2	6.7
Both	7	23.3

Table 6: Evaluation of weight and BMI before and after procedure.

	Before procedure	After procedure	P value
Weight (kg)	61.07±12.92	61.07±13.33	0.611
BMI (kg/m2)	22.84±4.31	22.79±4.39	0.673

As shown in this table 6, the weight gain 2 months after the procedure was not statistically significant (p value -

0.611), this may be because we used a short time interval and the fact that most of our patients were suffering from head and neck cancers, hence had cancer cachexia.

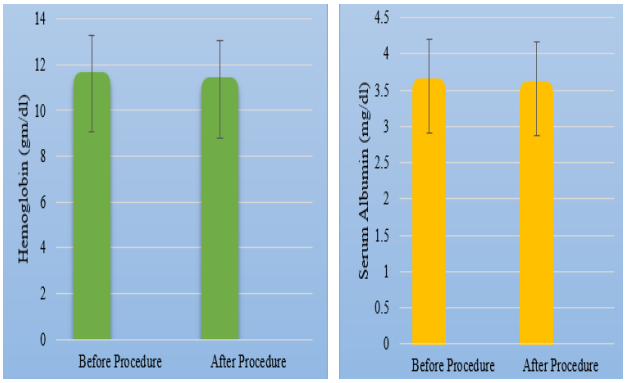

Figure 1: Evaluation of hemoglobin and Serum Albumin levels before and after procedure.

As seen in this figure 1 the haemoglobin levels and the serum albumin levels before and after the procedure had a P value of 0.16 and 0.7 may not be statistically significant but were stable.

Table 7: Complications of procedure.

Complications	No. of patients n=30	%
Absent	21	70.0
Present	9	30.0
Bleeding	1	3.3
PEG site infection	2	6.7
Blocked PEG tube.	2	6.7
Pain on site of insertion	1	3.3
Inner stopper retained	1	3.3
Displaced PEG tube	1	3.3
Necrotising Fascitis	1	3.3

Table 8: Reason for removal.

Reason for removal	No. of patients n=30	%
Post RT	12	40.0
Post RT+CT	5	16.7
Due to complications	2	6.7
Unable to PEG	1	3.3
Patients still on Tube	10	33.3

Table 9: Correlation of clinical variables with incidence of complications of procedure.

Clinical variables	Total no. of patients (n=30)	Complications		P value
		Absent (n=21)	Present (n=9)	
Age in years				
<50 years	10 (33.3%)	6 (28.6%)	1 (11.1%)	0.393
>50 years	20 (66.7%)	15 (71.4%)	8 (88.9%)	
Gender				
Male	25 (83.3%)	17 (81%)	8 (88.9%)	1.000
Female	5 (16.7%)	4 (19%)	1 (11.1%)	
Diagnosis				
Head & Neck cancer	25 (83.3%)	18 (85.7%)	7 (77.8%)	0.622
Others	5 (16.7%)	3 (14.3%)	2 (22.2%)	
Indication				
Pre RT	9 (30%)	5 (23.8%)	4 (44.4%)	0.526
Pre RT+CT	14 (46.7%)	11 (52.4%)	3 (33.3%)	
Long term feeding	7 (23.3%)	5 (23.8%)	2 (22.2%)	
Co-morbid condition				
Absent	20 (66.7%)	14 (66.7%)	6 (66.7%)	1.000
Present	10 (33.3%)	7 (33.3%)	3 (33.3%)	
Hemoglobin (gm/dl)				
8-10	14 (46.7%)	10 (47.6%)	4 (44.4%)	0.511
10-12	6 (20%)	3 (14.3%)	3 (33.3%)	
>12	10 (33.3%)	8 (38.1%)	2 (22.2%)	
Serum Albumin (mg/dl)				
<3.5	15 (50%)	9 (42.9%)	6 (66.7%)	0.427
3.5-5.0	15 (50%)	12 (57.1%)	3 (33.3%)	

As shown in this table 7 most of our patients had no complications (70%) as compared to 30 % of our patients who had complications, mostly minor. This table shows each of the complications; bleeding due to PEG was seen in one patient (3.3%), as were pain on the site of insertion (3.3%), inner stopper retained (3.3%), displaced PEG

tube (3.3%), necrotizing fasciitis (3.3%) PEG site infection and blocked PEG tube were seen in two patients (6.7%).

DISCUSSION

Since it was first described, PEG has been a widely used technique for long-term enteral feeding in patients who have a functionally intact gut but who cannot eat due to medical problems. The enteral route for nutrition has been found to be superior to parenteral feeding in patients unable to take food by mouth.[4,5]

According to various studies, the most common indications for PEG tube placement are neurological disorders, such as cerebral ischemia, dementia and cerebral tumors.[6]

However, in present study, we had 30 patients of which 25 were for head and neck cancers and 5 for neurological problems. Of the neurological problems, two patients had severe head and facial trauma, one patient had stroke and needed long term feeding.

One patient with swallowing disorder underwent PEG tube placement and not a surgical intervention as the patient had history of previous stroke and myocardial infraction, other risk factors such as diabetes and hypertension and he was over 90 years of age, keeping the high risk involved in a surgical intervention, the care givers of the patient wanted no surgical intervention. Hence the option of PEG tube placement was advised for feeding the patient.

Nutritional status of our patients was studied by the measurements of BMI, hemoglobin, body weight, and serum albumin. Bodyweight is the single most important index of nutritional status in most patients.

Bodyweight and BMI of the present patients were 22.84±4.31 kg/m2 before PEG insertion. At 2 months follow up BMI was 22.79±4.39(P =0.673). This was not statistically significant; this may be because we didn't follow up our patients for more than two months. The mortality rate in PEG procedures has been found to differ between 0 and 3% in previous studies. We lost no patients due to major complications related to the procedure.

Kohli and Bloch reported that the procedure-related mortality rate was 2% and overall early mortality rate was 16%.[7] According to some studies, overall early mortality rate ranged from 8% to 26%, and late mortality rate ranged from 13% to 60%. Death occurs mostly due to patient primary disease. In our two months follow up period for patients we lost no patient due to complications or the primary disease.

Percutaneous endoscopic gastrostomy is a preferred procedure compared to surgical gastrostomy because of its lower mortality and complication rates, placement under local anesthesia and short duration of the procedure. Also, the ease with which this procedure can be done in the endoscopy suite thereby reducing cost to the patient. In our secondary level hospital, the cost of this procedure including the hospital stay and the PEG set was approximately seven thousand.

Lowe et al compared 317 PEG and 75 primary open gastrostomy procedures and found similar complication and mortality rates.[8,9] Despite the fact that both applications result in very similar complication and mortality rates, because open gastrostomy requires general anesthesia, is more expensive and has a longer time to recovery, it can easily be determined that PEG is the better method.

Wasiljew et al reported that the complication rate associated with surgical gastrostomy was 16%.[10] In a similar study by Ruge and Vasquez, procedure-related mortality rate was found to be 1.8% and the rate of overall complications was 13.5% in 163 adult patients.[11] Previous reports indicate that the overall complication rate associated with PEG placement ranged from 2.5% to 16% and the mortality rates ranged from 1% to 2.5%.

In some studies, total complication rates differ between 9% and 43%. Akcan et al found that the early complication rate was 17% in their study.

Similarly, Steffes et al reported that the minor complication rate was 9.5%, and the major complication rate was 20%.[12] The rates of early and late complications in present study are comparable to those of recent reports.The rate of early complications (< 30 days) was 20 % (6 in 30 patients), and that of late complications (> 30 days) was 10% (3 in 30 patients) in present study.

In present study, we had one major complication one of the patients developed necrotizing fasciitis. Necrotizing fasciitis is a well-known major complication due to PEG procedure.The above patient was suffering from head and neck cancer and was malnourished and was also a diabetic, these factors are known put the patient at a higher risk for necrotizing fasciitis. She was treated with surgical debridement, intravenous antibiotics and daily dressings.

The minor complications were largely due to wound infections, and this rate was reduced with the routine use of prophylactic antibiotics. Sharma and Howden, and Dormann et al applied antibiotic prophylaxis before the procedure and observed reduced infection rates (from 73% to 17.5% and from 26.5% to 14.5%, respectively). According to these studies, single-dose application of wide spectrum parenteral antibiotic 30 min before PEG procedure could reduce the risk of wound and systemic infection.[13,14] In the present study a single-dose parenteral antibiotic 30 min before the procedure and only two patients (6.6%) developed wound infection.

They recovered without any problem after use of additional antibiotic and careful wound dressing. Tube feeding was started 24 hours after placement. Patients were kept nil by mouth for 12 hours. Recent studies indicate that commencement of feeding after 24 hours is not more effective than starting after 3 hours. But we found that by starting feeds after 24 hours none of our patients had developed intolerance to feed or reflux or vomiting.

In two of the present patients, PEG tube placement was repeated due to tube blockage and tube displacement. The gastrostomy tubes were removed in 17 patients because they had regained the ability to maintain their nutrition by oral feeding after RT and chemotherapy. One Peg tube was removed due to complication, necrotizing fasciitis. Generally, endoscopy is needed for removal of PEG tubes. But we took the tubes out directly and encountered only one minor complications of a retained internal bumper, which was removed with the help of an endoscope.

Externally, removable PEG tubes require an internal bumper that can collapse to a size that is small enough to allow for its removal through the abdominal wall by external traction. Akcan et al reported that nasogastric feeding is a method poorly tolerated by patients because of aspiration and local irritation.[15] Therefore, we conclude that PEG tube placement should be performed in patients with oral feeding problems who need enteral feeding for at least 1 month or more.

CONCLUSION

Authors found the results of the present prospective study demonstrate that long-term enteral feeding via PEG is a safe, effective, easy-to-apply, and highly acceptable method with excellent long-term results and with minimal complications.

ACKNOWLEDGEMENTS

Authors would like to thank their endoscopy staff for all the help given during the period of this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sunny A, Venkatanarasimhan NS, Kumar A. A prospective descriptive study to evaluate the impact of percutaneous endoscopic gastrostomy in patients who require nutritional support. Int Surg J 2018;5:3282-7.