

Original Articles

Percutaneous endoscopic gastrostomy for long term enteral nutrition

K. M. MOHANDAS, U. R. DAVE, V. SANTHI SWAROOP, D. C. DESAI, V. DHIR, S. A. PRADHAN, H. M. BATHENA, N. M. KAVARANA

ABSTRACT

Background. Percutaneous endoscopic gastrostomy for long term enteral nutrition is often indicated in patients with head, neck and oesophageal cancer but despite its growing popularity elsewhere, it is not widely used in India.

Methods. Between March 1990 and July 1991, we performed percutaneous endoscopic gastrostomy in 54 patients. The primary sites of tumour were the hypopharynx (11), oral cavity (7), tongue (7), cricopharynx (7), oesophagus (16) and other sites (6). The indications were difficulty in swallowing following treatment (22), preoperative nutritional support (7) and terminal care (21). In 49 patients, it was performed by the 'pull' technique in the endoscopy room under local anaesthesia and mild sedation. Indigenously prepared tubes and blenderised foods were used. Fifteen patients underwent dilatation of the tumour prior to the gastrostomy.

Results. The procedure was successful in 50 (93%) patients. Three failures were caused by obstructing tumours and one by a previous gastric resection. Feeding was started 18 to 24 hours after the procedure in 48 patients. No major complications occurred but minor complications were seen in 11 (22%) patients. Fourteen patients had their gastrostomy tube removed after 2 to 6 months of use while 15 patients undergoing therapy or with persistent dysphagia were on gastrostomy feeds for 1 to 6 months. Of the 21 terminally ill patients, 8 died, 6 were lost to follow up and 7 were on feeds for 1 to 6 months.

Conclusions. Percutaneous endoscopic gastrostomy is a simple, safe and effective method for long term enteral feeding. Indigenous tubes and home made blenderised foods are adequate substitutes for the more expensive commercial kits and enteral formulations.

INTRODUCTION

Percutaneous endoscopic gastrostomy (PEG) is usually performed in the endoscopy room under local anaesthesia

with the patient under mild sedation.¹⁻⁹ It has a low morbidity and has largely replaced surgical gastrostomy in Europe and North America.⁸⁻⁹ A large number of patients in India require nutritional support. Malnutrition and cachexia are frequent in those with cancer, being major contributors to their morbidity and mortality.¹ This is particularly so in patients with head, neck and oesophageal cancers who have difficulty and pain during swallowing, a dry mouth, mucositis, lack of appetite and an absence of taste. Better maintenance of nutritional status and the aesthetic advantage of not requiring a tube in the nose has made PEG acceptable to patients for therapy and terminal care.¹⁻⁶ PEG has not been widely used in India in spite of its growing use abroad, probably because the commercial PEG kits have to be imported and are very expensive. We present our experience of 50 consecutive PEGs in patients with head, neck and oesophageal cancer using indigenously prepared kits and home made blenderised foods.¹⁰

MATERIALS AND METHODS

Between March 1990 and July 1991, 54 patients with head, neck and oesophageal cancers were referred for PEG. There were 38 men and 16 women whose ages ranged from 18 to 80 years (mean 52 years). The 50 successful procedures performed form the basis of this study. The location of the primary tumour and the indication for PEG are listed in Tables I and II.

PEG tube construction

The PEG tubes were made from 18 to 22 F Foley catheters, Medicut cannulae or plastic pipette tips and a monofilament nylon fishing line.^{11,12} These tubes and accessories were packed and sterilized with ethylene oxide. To prepare each indigenous kit costs between Rs 30 and Rs 50.

Technique

The procedures were carried out with equal success by two staff gastroenterologists and three trainee residents. Forty-nine PEGs were performed in the endoscopy room using local anaesthesia (2% xylocaine) and intravenous sedation (diazepam 5 to 10 mg and pentazocin 15 to 30 mg).

Tata Memorial Hospital, Parel, Bombay 400012, Maharashtra, India

K. M. MOHANDAS, U. R. DAVE, V. SANTHI SWAROOP,
D. C. DESAI, V. DHIR Department of Gastroenterology
S. A. PRADHAN, H. M. BATHENA, N. M. KAVARANA
Department of Surgical Oncology

Correspondence to K. M. MOHANDAS

© The National Medical Journal of India 1992

TABLE I. Site of primary tumour

Site	n
Oral cavity	7
Tongue	7
Hypopharynx	11
Cricopharynx	7*
Oropharynx	1
Larynx	2
Cervical oesophagus	8
Middle oesophagus	5
Lower oesophagus	3*
Parotid gland	1
Thyroid	1
Neck lymph nodes	1

* PEG failed in 3 patients with cricopharyngeal tumours and in one with a resected lower oesophageal tumour

TABLE II. Indications for PEG

<i>Terminal care</i>	21
1. Swallowing difficulty	21
2. Laryngeal aspiration	10
3. Oesophago-pulmonary fistula	8
<i>Swallowing difficulty</i>	22
1. Postoperative	20
2. Post-irradiation	15
<i>Preoperative nutrition</i>	7

One PEG was performed in the operating room during total glossectomy and neck dissection. All the PEGs employed the pull technique originally described by Ponsky and Gauderer.¹³ Prior to PEG, 15 patients with obstructing tumours underwent a Savary-Gillard dilatation. A 3 metre long monofilament nylon line was passed through the PEG tube while performing the procedure in patients with obstructing tumours as a retrieval line. All patients were advised povidone-iodine gargles prior to the PEG. Antibiotic prophylaxis was administered to 28 patients not receiving antibiotic therapy. Cefazolin 1 g and gentamycin 80 mg (half an hour before the procedure and 8 and 16 hours after) were given to 12 patients, and ciprofloxacin 500 mg (half an hour before and 12 hours after) to 16 patients.

Chest physiotherapy was given to patients with infected wounds and intravenous fluids to those with fluid and electrolyte disturbances. The total procedure including dilatation lasted 15 to 35 minutes and feeding was started 18 to 24 hours afterwards. Ambulatory patients were discharged within 48 hours. All patients with potentially curable tumours were followed up and those with recurrent and advanced tumours were asked to return only if they wished.

Diet

The patients were evaluated by a dietician regarding their normal food habits and preferences. The constituents of the diet, method of preparation and care of the tube during and after feeds were carefully explained both to the patients and their relatives. The usual daily diet

consisted of 2000 to 3000 calories and 50 to 75 g of protein in five 250 to 300 ml bolus feeds. The items included blenderised and non-blenderised foods such as milk, soya beans, eggs, groundnuts, pulses, legumes, cereals and fruits.¹⁴

RESULTS

Technical success

The procedure was successful in 50 (93%) out of 54 patients. It failed in 3 patients who had completely obstructing cricopharyngeal tumours which did not permit the passage of a Savary-Gillard dilator guide wire. In another patient who had had an oesophagogastrrectomy previously, the gastric remnant could not be transilluminated and the procedure was not completed. Pain was mild following PEG and feeding was started within 24 hours in 48 patients. Two patients with fever were observed for two days before starting the PEG feeds. Minor technical problems were encountered in 5 patients. One patient with an advanced pyriform fossa tumour developed temporary stridor during endoscopy. Transient hold up of the PEG tube occurred in two patients with obstructed oesophageal cancers which had not been previously dilated. Subsequently all patients with obstruction were dilated to 12.8 mm or more and the PEG performed without difficulty. One patient had extensive candidial oesophagitis and another had scabies but PEG was performed in both after appropriate treatment. Among the lesions detected incidentally during PEG were severe reflux oesophagitis (2), oesophageal ulcers (1), hiatus hernia (1), gastric ulcer (1) and duodenal ulcer (4).

Complications

There were 11 (22%) minor and no major complications due to either the procedure or the disease during the first 30 days (Table III). Minor wound infection was seen in 2 patients which subsided with local care and antibiotics. There were no instances of intraperitoneal leak, peritonitis, necrotizing fasciitis, bleeding or prolonged paralytic ileus. Three patients developed fever—one was caused by a pyrogen reaction to intravenous fluids, another by aggravation of pre-existing bronchopneumonia from a tracheo-oesophageal fistula and no cause was found in the third. The introduction of a powdered tablet of ranitidine and soya bean powder caused transient blockage of the PEG tube in two patients but this was cleared using a guide wire. A month later, 2 patients developed peristomal leaks which were managed by applying paste locally.

TABLE III. Complications following PEG

Minor wound infection	2
Unexplained fever	1
Fever with hypotension	1*
Pyrogen reaction	1
Transient stridor	1
Gastro-oesophageal reflux	1
Peristomal leak	2
Tube blockage	2

* had tracheo-oesophageal fistula and bronchopneumonia before PEG

TABLE IV. Follow up and outcome

<i>Swallowing normal; PEG removed</i>	14
After surgery	11
After radiotherapy	2
After chemotherapy	1
<i>PEG feeds continued</i>	15
Undergoing therapy	6
Swallowing not normal	9
<i>Terminal care</i>	15
<i>Lost to follow up</i>	6

TABLE V. Success, morbidity and mortality related to PEG in head and neck cancers

Reference	n	Success (%)	PEG related complications (%)		
			Minor	Major	Mortality
Hunter <i>et al.</i> ²	54	93	10	4	–
Shike <i>et al.</i> ³	42	93	10.3	–	–
O'Dwyer <i>et al.</i> ⁶	55	100	5.5	1.8	1.8
Luetzow <i>et al.</i> ¹⁵	24	96	29	8	–
Present study*	54	93	22	–	–

* includes oesophageal cancer

Long term benefits

Information on long term feeding at follow up was available in 44 (80%) patients (Table IV). Fourteen (28%) patients regained the ability to swallow adequately 2 to 6 months (mean 4 months) after therapy and had the tube removed by endoscopy. Fifteen (30%) patients were still either undergoing treatment or their swallowing difficulty had not been cured. In these patients the PEG feeds had been given for between 1 and 6 months (mean 2 months). One patient had his tube replaced by a Foley's catheter 5 months later. Fifteen (30%) of the 21 patients who underwent PEG for terminal care continued to use it until death. Eight patients with oesophageal cancer died 1 to 6 months after the PEG and 6 were lost to follow up.

DISCUSSION

Nasogastric tube feeding is the most popular method of enteral nutrition in India. However its use on a long term basis is associated with many complications^{1,15} such as reflux oesophagitis, candidiasis, erosive gastritis and peptic ulcers. PEG on the other hand is less irritating, the tube has a larger lumen which accommodates thick blenderised foods and is less prone to migration and dislodgement.^{1,3}

PEG should therefore be considered for all paediatric and adult patients who have an intact functional gastrointestinal tract but are unable to take adequate nutrition.⁷ The procedure is mostly indicated for patients who have neurological disorders with impaired swallowing and patients with head, neck and oesophageal cancers.⁷⁻⁹ However, it is probably unnecessary for patients with rapidly progressive disease who can be managed by short term nasoenteral tube feeding.⁷ PEG allows a patient to appear in public without the embarrassment of a tube protruding through his nostril. Further the performance

of PEG in both children and adults is quick, associated with fewer complications and less expensive than a formal surgical gastrostomy.^{8,9} It can also be performed as an out patient procedure.³ A further benefit is that the oesophagus, stomach and duodenum are visualized and any associated lesions can then be detected. The benefits of a large bore gastrostomy and the simplicity of the technique have made PEG the procedure of choice for long term enteral feeding in Europe and North America.⁷⁻⁹ In fact it is recommended that a surgeon should always consider PEG before embarking on surgical gastrostomy.⁹

PEG is associated with a failure rate of 3% to 10% (Table V).¹⁻⁶ Obstructing tumours are relative contraindications for PEG,⁷ but these lesions can be dilated and the procedure performed.^{7,9} We successfully performed PEG following a Savary-Gillard dilatation in 15 out of 18 patients with obstruction. Patients with large hypopharyngeal or laryngeal tumours may occasionally develop stridor during endoscopy and in these patients the PEG should probably be performed only after surgical resection, or after a tracheostomy if the tumour is not resectable. Impaction of the PEG tube can occur in a stricture or a tumour with an inadequate lumen. This can be avoided by prior dilatation and by using a nylon retrieval line to pull back the impacted tube.^{8,9} The implantation of tumour cells in the PEG tract has been reported recently.^{16,17} While we have not experienced this complication, we agree that there is a need for caution in selecting PEG for patients with potentially curable tumours. This should not be a major contraindication to the technique as most PEGs are performed either for non-curable tumours or for swallowing disorders resulting from surgery or radiotherapy.

In spite of the increasing popularity of the PEG elsewhere, this simple procedure is not commonly performed in India. The deterrents are the high cost and difficulties in procuring imported enteral feeding formulations and commercial PEG kits (Rs 1500 to Rs 5000).^{9,18} Our experience has shown that home made PEG kits can be used to overcome these obstacles and blenderised vegetarian and non-vegetarian diets can easily be prepared at home in both towns and villages as perfectly adequate substitutes.

The role of antibiotic therapy is controversial and adds to the procedural costs.^{8,9} We began performing PEG on a cautious note, using 3 doses of cefazolin and gentamycin prophylaxis as the majority of our patients were malnourished with poor oral hygiene. They also had infected wounds or tumours in the aerodigestive tract. The use of a single dose of cephalosporin before PEG may be cost effective and needs to be evaluated. A review of the antibiotic sensitivity of the oropharyngeal pathogens in our first 18 patients has favoured ciprofloxacin over first and third generation cephalosporins. Although PEG can be performed in out patient settings^{1,8} in the majority of our patients this is not possible because they are uneducated, cannot afford to stay nearby and have poor personal hygiene. We therefore kept our patients in hospital for 48 hours during which time the patients and their relatives were taught how to care for the PEG tubes.

This period has now been reduced to less than 24 hours.

As PEG is simple to perform and accompanied by little morbidity and no mortality, it may be used early in the course of a patient's disease avoiding prolonged nasogastric tube feeding or partial intravenous nutrition. Previous studies have shown that PEG feeds enable patients with cancer to tolerate and complete tumour therapy (including multiple operations, radiation and chemotherapy) because their nutrition is better maintained.

We conclude that PEG is a safe, easy to perform and cost-effective procedure for long term enteral feeding and our 'home made' PEG tubes and blenderised foods are effective substitutes for the imported products.

REFERENCES

- Shike M, Brennen MF. Nutritional support. In: Devita VT Jr, Hellman S, Rosenberg SA (eds). *Cancer: Principles and practice of oncology*. Philadelphia: Lippincott Company, 1990:2029-44.
- Hunter JG, Lauretano L, Shellito PC. Percutaneous endoscopic gastrostomy in head and neck cancer patients. *Ann Surg* 1989; **210**:42-6.
- Shike M, Berner YN, Gerdes H, *et al.* Percutaneous endoscopic gastrostomy and jejunostomy for long term feeding in patients with cancer of head and neck. *Otolaryngol Head Neck Surg* 1989; **101**:549-54.
- Stellato TA, Gauderer MW. Percutaneous endoscopic gastrostomy in the cancer patients. *Am Surg* 1988; **54**:419-22.
- Iro H, Fietkau R, Kolb S, Nitsche N. Nutrition of ENT tumor patients treated with radiotherapy. Comparison of oral and enteral nutrition using percutaneous gastrostomy. *HNO* 1989; **37**:343-8.
- O'Dwyer TP, Gullane PJ, Awerbuch D, Chia-Suig HO. Percutaneous feeding gastrostomy in patients with head and neck tumors: A 5-year review. *Laryngoscope* 1990; **100**:29-32.
- Anonymous. The role of percutaneous endoscopic gastrostomy in enteral feeding. Guidelines for clinical application. *Gastrointest Endosc* 1988; **34**:358-68.
- Mamel JJ. Percutaneous endoscopic gastrostomy. *Am J Gastroenterol* 1989; **84**:703-10.
- Moran BJ, Taylor MB, Johnson CD. Percutaneous endoscopic gastrostomy. *Br J Surg* 1990; **77**:858-62.
- Antia FP. *Clinical dietetics and nutrition*. Bombay: Oxford University Press, 1989:366-73.
- Mohandas KM, Santhi Swaroop V, Desai DC, *et al.* Percutaneous endoscopic gastrostomy for enteral feeding. *Indian J Gastroenterol* 1991; **10**:29-30.
- Mohandas KM, Santhi Swaroop V. Indigenous PEG tubes: Further modification. *Indian J Gastroenterol* 1991; **10**:113.
- Ponsky JL, Gauderer MW. Percutaneous endoscopic gastrostomy: A non operative technique for feeding gastrostomy. *Gastrointest Endosc* 1981; **27**:9-11.
- Kowli A, Sreenivasan L, Eapen S, Pradhan SA. Diet for cancer patients: Tube feeding formulations. *Indian J Cancer* 1982; **19**:226-30.
- Luetzow AM, Chaffoo RAK, Young H. Percutaneous endoscopic gastrostomy: The Stanford experience. *Laryngoscope* 1988; **98**:1035-9.
- Preyer S, Thul P. Gastric metastasis of squamous cell carcinoma of the head and neck after percutaneous endoscopic gastrostomy. Report of a case. *Endoscopy* 1989; **21**:295.
- Bushnell L, White TW, Hunter JG. Metastatic implantation of laryngeal cancer at a PEG exit site. *Gastrointest Endosc* 1991; **37**:480-2.
- Anonymous. Self-reliance in biomedical devices. *Natl Med J India* 1989; **2**:161-2.

Enteral nutrition in surgical patients

D. N. LOBO, A. K. SARKAR, N. MARWAHA, G. SINGH, S. K. KHANNA

ABSTRACT

Background. Malnutrition is common in patients admitted for surgery and is a major cause of increased morbidity and mortality. Nutritional support has been shown to be of help in reducing complications. Parenteral nutrition and commercially available enteral diets are expensive, so the efficacy of a 'home-brew' enteral diet was studied in such patients.

Methods. Forty malnourished patients, 20 with benign disease and 20 with malignancy, were administered a 'home-

brew' enteral diet (1140 calories and 60 g protein per litre) perioperatively for 14 days. They received 2500 to 4000 calories per day according to their requirement. Weight, triceps skinfold thickness, midarm circumference, serum albumin and transferrin, absolute lymphocyte count and creatinine-height index were monitored on days 0, 7 and 14. Nitrogen balance was estimated on alternate days and the results of the two groups were compared.

Results. Weight, skinfold thickness and midarm circumference did not change. Serum albumin levels showed a rise in the benign group by day 7, but the rise attained significance in the malignancy group by day 14. A similar pattern was observed in transferrin levels and there was a significant correlation ($r=0.652$, $p<0.001$) between albumin and transferrin levels. A positive nitrogen balance was attained earlier in the benign group (4.3 v. 5.8 days, $p<0.001$). The

Postgraduate Institute of Medical Education and Research,
Chandigarh 160012, India

D. N. LOBO, G. SINGH, S. K. KHANNA Department of Surgery

A. K. SARKAR Department of Biochemistry

N. MARWAHA Department of Haematology

Correspondence to S. K. KHANNA