PERCUTANEOUS ENDOSCOPIC GASTROSTOMY: RESULTS OF 50 CASES

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ABSTRACT

Objective: To present the results of percutaneous endoscopic gastrostomy (PEG), which has been an alternative method to conventional surgical gastrostomy for the last 20 years. PEG is one of the gastrostomy methods used for patients unable to take food orally.

Patients and Methods: Between January 1996 and July 2000, 50 consecutive patients in need of enteral feeding for more than four weeks and undergoing PEG with 20 Fr tube by pull technique were retrospectively evaluated in terms of indication, complications, durability of tube, and mortality. The assessment of wound infection was conducted according to the criteria developed by Jain and Shapiro.

Results: A PEG was successfully positioned in 50 of the 52 referred patients (96%). Of the 50 cases 26 (52%) were men and 24 (48%) women with the median age of 63 years (range 2 to 88 years). Indications for PEG placement were cerebrovascular accident in 20, brain tumors in 11, subarachnoidal hemorrhage in 9, several neurologic disorders in 5 (2 infections, 2 Parkinson's disease, 1 Alzheimer's disease), head injury in 3, iatrogenic in 1 (esophago-cutaneous fistula), and hypoxic encephalopathy in 1. The durability of the tube was a median of 217.5 days (range 9 to 1669 days). In 9 patients the tube was removed with a median of 158.5 days (range 35 to 427 days) and then oral feeding was started. The tube was changed in 7 patients who had tube dysfunction because of clogging, porosity or fracture with a median interval of 122 days (range 35 to 1252 days). Of these patients, 2 needed replacement tube insertion twice and 3 three times. Two (4%) cases had minor complications (wound infection) during the the first 30 days. During total follow-up, two wound infections, one buried bumper syndrome, and one aspiration pneumonia developed. The last patient underwent JETPEG which was performed by introducing a 10 Fr jejunal tube through the 20 Fr PEG opening. Total follow-up was 41.8 patient-years with a procedure-related mortality of 0%, 30-day mortality of 8% (4/50), and overall mortality of 32% (16/50). The mortality rate was 63.6% (7/11) for patients who had brain tumor and 23% (9/39) for the rest.

Conclusion: PEG is a minimally invasive gastrostomy method with low morbidity and mortality rates, easy to follow-up, easy to replace when clogged.

Key Words: Percutaneous endoscopic gastrostomy, Enteral feeding.

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INTRODUCTION

Percutaneous endoscopic gastrostomy (PEG) is an alternative to traditional surgical methods for creating a feeding gastrostomy. Since its first description by Gauderer and Ponsky (1) in 1980, PEG has become a widely accepted means of providing enteral alimentation. The most common indication for PEG tube placement is to provide access to a functioning gastrointestinal tract for long-term enteral nutrition (2). This term is usually accepted as a minimum of 4 weeks (3). Patients in this group often have neurologic disorders and neoplasms of the head, neck, and esophagus. Other applications of PEG include decompression in patients with malignant carcinomatosis and intestinal obstruction, treatment of gastric volvulus, recirculation of bile, accessing the stomach for endoscopic or surgical instrumentation, administration of unpalatable medications to pediatric patients, and provision of nutrition to patients in various hypercatabolic states (such as those with Crohn's disease and severe burns) (2,4,5). Absolute contraindications to PEG tube placement include a limited life expectancy, inability to pass the endoscope through the esophagus, and peritonitis (6,7). Relative contraindications include massive ascites, coagulopathy, portal hypertension, peritoneal dialysis, hepatomegaly, large hiatal hernia, prior subtotal gastrectomy, morbid obesity, anorexia nervosa, and infiltrative or malignant disorders of the stomach (2,7-9).

PEG can be performed by the pull method, the introducer method, or the push method (2). However, the "pull method" has changed little since its original description and remains the most popular method of PEG tube placement (1,2,10). Major complications of PEG include peritonitis, hemorrhage, aspiration, peristomal wound infection, buried bumper syndrome, and gastrocolic fistula (2,11,12). The morbidity rate is given as approximately 3% in large series (13,14). These complications are uncommon, but when they occur they result in death in 25% of the patients. One of the most common complications of PEG is aspiration especially in patients who have preexisting gastro-esophageal reflux disease. JETPEG (introducing a thinner jejunal tube distally to Treitz's ligament through the PEG) has recently become more popularized to avoid this complication (3,4,15).

PATIENTS AND METHODS

Patients:

Between January 1996 and July 2000, 52 patients were referred from Marmara University Institute of Neurologic Sciences to our endoscopy unit for the placement of a PEG tube. Of the 52 patients, a PEG was successfully positioned in 50. Patients, or in the case of complete incapacitation, their legally responsible relatives, were informed about the possibilities and risks associated with PEG and written informed consent was obtained from each of them.

The PEG Technique:

All patients received antibiotic prophylaxis, 1 g ceftriaxone (Rocephin®, Roche) intravenously, 30 minutes before PEG placement and weight- and age-adapted premedication (up to 100 mg pethidine, or 5 mg midazolam). Local disinfection of the oropharyngeal cavity was not done. The patients' abdomen was thoroughly disinfected from the costal margin to the navel.

PEG placement was applied using the "pull method" (16). After preparation of the abdomen, a complete upper gastrointestinal endoscopy was performed. The stomach was then insufflated, resulting in close opposition of the stomach to the abdominal wall. A local anesthetic (Jetocaine®, Adeka) was infiltrated into the skin in the midepigastrium where there was maximum transillumination and indentation of the gastric lumen by an examining finger. After performing a 5 mm skin incision, a 16-gauge angiocath was inserted into the gastric lumen under direct endoscopic observation. A guidewire was threaded through the angiocath and grasped with a snare. After the endoscope and the snare grasping the guidewire were withdrawn from the mouth at the same time, the tapered end of the gastrostomy tube was secured to the guidewire and the PEG tube guidewire unit was placed in the stomach by pulling the end of the guidewire exiting the skin incision. The internal bumper remained in the gastric lumen. The external bumper was subsequently used to secure the PEG tube in place. A control endoscopy was done to be sure of the success of the procedure and to check for any complications.

After PEG tube placement, both the patient and the family members as well were instructed by nurses concerning the system of nutrition and the use of the feeding pump. Patients were allowed to return home once they had mastered the implementation of the system. Nutrition was initiated 4-24 hours after complication-free PEG placement, and the level was increased continuously over several days up to individually adequate feeding rate, in order to minimize the side effects of tube-based nutrition.

Follow-up and Evaluation of Peristomal Wound Infection:

All the patients were followed-up daily for the first week, then weekly for the first month, and monthly thereafter. Discharged patients were also followed-up monthly by telephone inquiries. For the first 7 days after PEG tube placement, the wound dressing at the site of puncture was renewed daily by the same team and checked for possible infection. The assessment of wound infection was conducted on a daily basis according to the criteria developed by Jain et al. (17) and Shapiro et al. (18), as shown in Table I. Patients were defined as having minor or major complications according to their daily score (Table II).

RESULTS

In 2 of 52 patients (4%), PEG placement was not possible due to failure to achieve transillumination

Table I. The scale for the assessment of local wound infection.

	0	1	2	3	4
Erythema	no	<5 mm	6-10 mm	11-15 mm	>15 mm
Induration	no	<10 mm	11-15 mm	>15 mm	
Exudate	no	serous	sero-sanguineous	sanguineous	purulent

Table II. Classification of infectious complications according to the patients' daily score.

	Daily score
Grade I	less then 2
Grade II	between 3 and 8
Grade III	over 8 or manifest purulent exudate
Grade IV	Peritonitis or had to have PEG removed
Grade I-II-III : minor complication **Grade IV : major complication**	

Table III. Indications for PEG tube placement.

Cerebrovascular accident	20
Brain tumor	11
Subarachnoidal hemorrhage	9
Miscallaneous neurologic disorders	5
Infectious	2
Parkinson's disease	2
Alzheimer's disease	1
Head injury	3
Iatrogenic (esophago-cutaneous fistula)	1
Hypoxic encephalopathy	1

or "safe tract" technique explained below. Of the 50 cases, 26 (52%) were men, 24 (48%) women with the median age of 63 years (range 2 to 88 years). The indications for PEG tube placement are shown in Table III. The durability of the tube was a median of 217.5 days (range 9 to 1669 days). In 9 (18%) patients the tube was removed with a median of 158.5 days (range 35 to 427 days) because they were able to return to oral feeding. The tubes were changed in 7 (14%) patients who had tube dysfunction due to clogging, porosity or fracture with a median interval of 122 days (range 35 to 1252 days). Of those patients, 2 needed replacement tube insertion twice, 3 three times. Minor complications (wound infection) developed in 2 (4%) patients during first 30 days. Neither hemorrhage nor major complication was seen in all patients. During total follow-up 4 (8%) complications (2 wound infections, 1 buried bumper syndrome, and 1 aspiration pneumonia) developed. The patients who had grade II-III wound infection were successfully treated by close wound care and antibiotics. Buried bumper syndrome was recognized incidentally when the patient underwent tube replacement because of porosity and clogging. Endoscopic finding was mucosal dimpling to non-visualization of the internal bolster. The problem was solved by dissecting the buried appliance from the abdominal wall under local anesthesia and a 15 Fr replacement tube inserted into the stomach from the same site. The patient who had aspiration pneumonia underwent JETPEG for the solution of the problem. JETPEG was performed by introducing a 10 Fr jejunal tube through the 20 Fr PEG tube, and placing it distally to the Treitz's ligament. Total follow-up was 41.8 patient-years. Procedure related mortality was 0%, 30-day mortality 8% (4/50), and overall mortality 32%

(16/50). The mortality rate was 63.6% (7/11) for patients who had brain tumors and 23% (9/39) for the rest.

DISCUSSION

Nutritional support can be quite challenging. The advantages of enteral nutrition over parenteral nutrition are well known and include lower cost, increased safety, better patient tolerance, maintenance of structural gastrointestinal integrity, and increased resistance against infection (19,20). Several advantages of the percutaneous approach compared to operative gastrostomy are the use of local anesthesia, decreased procedure time, ability to perform the procedure in the endoscopy suite, decreased cost and earlier feeding after placement (3,21). PEG for enteral nutrition has become widespread and offers distinct advantages with regard to cost and a low level of complications compared with parenteral nutrition (22,23). PEG proved to be a very safe and reliable method in the scope of literature. On the other hand, short- and long-term prospective studies have demonstrated the superiority of a PEG over nasogastric feeding tubes in patients with dysphagia due to chronic neurologic disease (3,24-27).

The performance of a full diagnostic upper endoscopy is imperative before PEG tube placement (2). Patients scheduled for PEG tube placement may have endoscopic findings, such as peptic ulcer disease and gastric outlet obstruction that ultimately lead to major modifications in management or abandonment of the procedure. Wolfsen et al. (28) gave this rate as high as 36%. However, we did not find such endoscopic findings before starting the procedure in our patients. Although it has been suggested that if a point of resistance is felt between the 3rd and 6th cm marking on the PEG tube or if the internal bumper can be appreciated by finger palpation of the abdominal wall, repeat endoscopy is not necessary; we preferred to perform it in order to avoid any suspicion in the endoscopist's mind (29,30). Several of the early papers describe transillumination of the stomach prior to gastric puncture as being integral to the procedure (21,31). Larson et al. (32) describe a failure to transilluminate the stomach as being an absolute contraindication to PEG tube insertion. However, it became a relative contraindication with pioneering the "safe tract technique" by Foutch et al. (33) and verifying in a retrospective series by Stewart and Hagan (34). When transillumination fails, we try the safe tract technique with gastric mucosal indentation which can be achieved by simple palpation, and then introduce 16-gauge angiocath into the stomach. This gives the safe way to gastric puncture. However, in our series, a PEG tube could not be positioned in two patients, even though both transillumination and the safe tract technique were used. In such circumstances, the other gastrostomy methods should be chosen instead of insisting on completion of the procedure.

The time interval between the PEG tube placement and feeding initiation is controversial. Some authors recommend 12-24 hours before initiating the PEG feeding, whereas others prefer 4 hours of rest after PEG tube placement (2,22). In a randomized prospective trial of early versus delayed feeding after PEG, it has been suggested that early initiation of PEG feeding is safe, well tolerated, and reduces cost by decreasing hospital stay (35). We allowed to feeding 4-24 hours after PEG placement.

Antibiotic prophylaxis is recommended as a general measure in PEG (22). It has been shown that antibiotic prophylaxis significantly reduces the risk of peristomal wound infection associated with PEG insertion (22). Dormann et al. (36) have shown that a single dose of ceftriaxone administered 30 minutes before PEG significantly reduces local and systemic infective complications. We preferred ceftriaxone as a prophylactic antibiotic to avoid infectious complications. The wound infection rate of the present study was as low as 4% when compared to 5-30% of the studies in the literature (2,36).

Buried bumper syndrome occurs when excessive traction is applied to the PEG tube for an extended period. This results in ischemic necrosis of the gastric mucosa and migration of the internal bolster into the gastric or abdominal wall. It usually becomes apparent after 4 months of use (2). This complication developed in one case in our series, almost one year after the PEG tube placement. Treatment requires dissection of the buried appliance from the abdominal wall, and the same site can be used for placement of

a second PEG or replacement tube. To prevent buried bumper syndrome, it is advisable to allow for an additional 1.5 cm between the external bumper of the PEG tube and the skin to minimize the risk of pressure necrosis (2).

Patients with gastroparesis and gastric atony, for instance neurosurgical trauma or with gastric outlet obstructions, are at risk of aspiration. Consistently, factors such as a history of aspiration (pneumonia), reflux esophagitis, age older than 70 years, absent swallowing, gag and cough reflexes and cerebrovascular accident emerge from published data as factors predisposing to aspiration (37,38). Despite many improvements in tube design and size, a tremendous controversy exists as to the use of a JETPEG (39). Opponents argue that the associated mortality and morbidity of a JETPEG tube together with the inability to protect against pulmonary complications and the high incidence of jejunal tube failure make its use unjustifiable (40,41). Those who advocated intestinal feeding have observed a substantial reduction in aspiration pneumonia and have accepted a high catheter failure (42). However, it has been shown in a recent study that JETPEG may reduce the aspiration risk in the compliant high-risk patients and those with ongoing or previously documented aspiration (3). In the same study, the catheter failure rate was 26.8% during extended follow-up, which was significantly lower than the reported 53% (3,40). In our series, we performed a JETPEG in one patient who had developed aspiration pneumonia during follow-up.

To summarize, during the 20 years since its introduction, PEG has remained the benchmark for long-term enteral alimentation against which all other such innovative methods must be measured. JETPEG should be reserved for well-selected patients at risk of aspiration.

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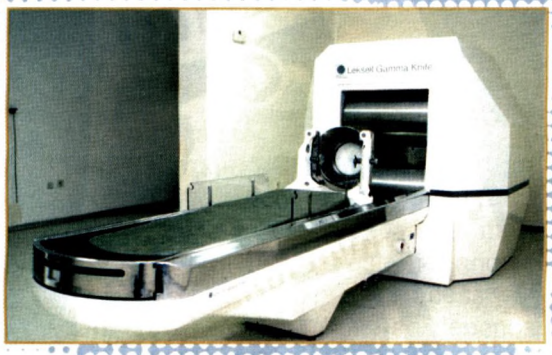

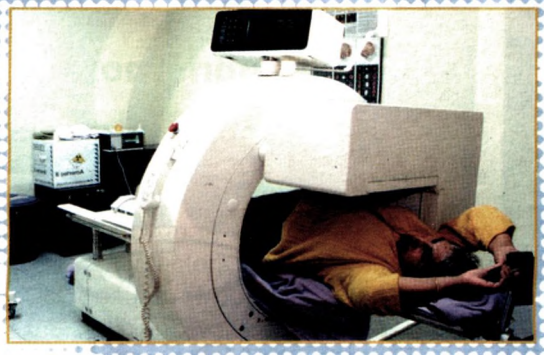

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