

BRIEF COMMUNICATION

Clinical Experience of Percutaneous Endoscopic Gastrostomy in Taiwanese Patients—310 Cases in 8 Years

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Although percutaneous endoscopic gastrostomy (PEG) has become a popular method for long-term tube feeding worldwide, there are only a few reports about its application in Taiwan. From May 1997 to May 2005, we performed 302 PEG insertions successfully in 310 attempts (97.4% success rate) using modified Ponsky's pull method with 24-Fr feeding tubes. All the patients received PEG for tube feeding except for two patients with cancerous peritonitis for decompression. The underlying diseases in these 308 patients who received PEG for tube feeding were 161 cerebrovascular accidents (52.3%), 62 head and neck cancers (20.1%), 21 cases of Parkinsonism (6.8%), and others. There were 11 major complications (3.6%) and 57 minor complications (18.9%). Ten patients (3.3%) died within 30 days after PEG insertion. However, no procedure-related mortality occurred. In conclusion, PEG is an effective method for tube feeding and drainage with a high success rate. PEG insertion was often indicated for patients with dysphagia caused by cerebrovascular accident, head and neck cancer, and Parkinsonism in Taiwan. It is a relatively safe procedure, with a 3.6% rate of major complications and 18.9% rate of minor complications. [*J Formos Med Assoc* 2007;106(8):685–689]

Key Words: percutaneous endoscopic gastrostomy, Taiwan

Since the introduction of percutaneous endoscopic gastrostomy (PEG) into clinical practice by Ponsky and Gauderer,¹ it has gained wide popularity and has become the procedure of choice for long-term nutritional support in patients who cannot swallow but have intact gut function.^{2–5} The usual indications are neurologic and oropharyngeal disorder.^{2,6–8} Although we encounter many such patients in daily practice, PEG is still not very popular in Taiwan, probably due to education and reimbursement problems. Here, we present our experience with 310 Taiwanese patients who underwent

PEG, and discuss the success rate, indications and complications of this procedure.

Materials and Methods

Between May 1997 and May 2005, we performed 302 PEG procedures at National Taiwan University Hospital, Taipei Hospital and Far Eastern Memorial Hospital. We used modified Ponsky's pull method¹ with 24-Fr feeding tubes (PEG-24-Pull; Wilson-Cook Medical Inc., Winston-Salem, NC, USA).

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We gave 25–50 mg meperidine intramuscularly to each patient before the procedure. We used transillumination and indentation methods^{3,7} to identify a suitable puncture site. After skin preparation and local anesthesia, we made a 1-cm incision over the selected site and put the guide wire into the stomach, then brought it out of the mouth by the snare. We tied the tube on the wire and pulled it through the mouth into the stomach and then outside the abdomen. We left a 0.5-cm space between the external bolster and skin initially to avoid over-tightness. We opened the feeding tube for drainage for 24 hours and started to feed the patient from the 2nd day. We administered 1 g cephalothin intravenously 30 minutes before the procedure for each patient.

Results

There were 211 male and 99 female patients (mean age, 70.1 years; age range, 15–103 years) who received PEG insertion in National Taiwan University Hospital, Taipei Hospital, and Far Eastern Memorial Hospital. We performed 302 PEG insertions successfully in 310 attempts (97.4% success rate). PEG insertion was unsuccessful in four cases where no suitable puncture site could be found, in three due to failure to pass the scope into the stomach, and in one due to cardiopulmonary instability during the procedure. All received PEG for tube feeding except for two patients with cancerous peritonitis for decompression. The primary malignancies of these two patients were gastric cancer and renal transitional cell carcinoma. The underlying diseases in the 308 cases who received PEG for tube feeding are shown in Table 1. Only seven cerebrovascular accident (CVA) patients received PEG insertion within 1 month of onset. Forty-two out of 62 patients with head and neck cancers received PEG insertion due to the late effect of radiotherapy.

Among the 302 successful PEG insertions, there were 19 patients with gastric ulcer, seven with gastric cancer, five with previous PEG wound, one with previous surgical gastrostomy wound, and 10 with ventriculoperitoneal shunt that did not preclude

Table 1. Underlying diseases in the 308 patients who received percutaneous endoscopic gastrostomy (PEG) insertion for tube feeding

Underlying disease for PEG insertion	n (%)
Cerebrovascular accident	161 (52.3)
Head and neck cancer	62 (20.1)
Parkinsonism	21 (6.8)
Dementia	13 (4.2)
Motor neuron disease	12 (3.9)
Hypoxic encephalopathy	9 (2.9)
Head injury	8 (2.6)
Central nervous system degenerative disease	7 (2.3)
Other	15 (4.9)

PEG insertion. Most of the patients with gastric cancer received PEG insertion due to concomitant neurologic dysphagia. Five of eight patients with partial gastrectomy had successful PEG insertion. There were two patients with esophageal cancer and one with gastric cardiac cancer who needed through-the-scope balloon dilatation before PEG insertion and one with corrosive stricture who needed Savary-Guilliard dilatation.

There were 11 major complications (3.6%), including one patient with suspected peritonitis who received surgical laparotomy within 1 day, one patient who developed atrial fibrillation with rapid ventricular response and needed to be transferred to the intensive care unit on the same day of PEG insertion, and nine cases of aspiration pneumonia (Table 2). There were 57 minor complications (18.9%), including 21 wound infections, nine cases of gastroparesis that interfered with feeding, and four incidental extubation within 1 month (Table 2). Ten patients (3.3%) died within 30 days after PEG insertion. However, there was no procedure-related mortality.

After PEG insertion, the feeding tube needs to be replaced if it is deformed, broken, clogged or removed inadvertently. Most of our patients received PEG replacement about 1 year after insertion of PEG-24-Pull tube; the time ranged from 6 months to 18 months depending on the manipulation of the tube and feeding content. Most of

Table 2. Complications associated with 302 successful percutaneous endoscopic gastrostomy insertions

	<i>n</i> (%)
Major complications	11 (3.6)
Aspiration pneumonia	9
Suspected peritonitis	1
Atrial fibrillation	1
Minor complications	57 (18.9)
Wound infection	21
Gastroparesis	9
Peristomal leakage	7
Upper gastrointestinal bleeding	6
Stomal bleeding	4
Incidental extubation	4
Diarrhea	3
Abdominal wall hematoma	1
Severe wound pain	1
Tube blockage	1

our patients received PEG replacement using PEG-24-Pull tube with endoscopic assistance instead of balloon replacement tube because the former tube is more pliable and durable. The gastrostomy can be used with repeated tube replacement and it can close after tube removal if the patient regains swallowing ability. In our series, the longest duration of PEG feeding was more than 8 years in one patient with old CVA, and the shortest duration was 3 months in a patient with hypopharyngeal cancer preparing for chemoradiation therapy.

Discussion

Enteral nutrition is the preferred route for nutritional support compared with parenteral nutrition if the gastrointestinal tract is functionally preserved.^{9,10} Nasogastric tubes have the advantage of being simple to insert, but are not well tolerated by patients and have some complications in long-term use. Since the introduction of PEG by Ponsky and Gauderer in 1981,¹ it has proven to be a fast and safe procedure and has become the most popular way of establishing long-term tube feeding.^{2,7,9,11,12} However, PEG is not popular in Taiwan

and there are only a few reports on its application in Taiwan.¹³⁻¹⁵

Similar to previous reports,^{2,6,7,16} the majority of the underlying diseases in our patients who received PEG insertion were neurologic disorders, including CVA, Parkinsonism, motor neuron disease, hypoxic encephalopathy, head injury and degenerative diseases. Most of our patients with CVA received PEG at a later stage, and only seven out of 157 cases were performed within 1 month of onset. Head and neck cancers are also important diseases for PEG insertion.^{3,17} However, unlike previously reported series, the majority of our patients received PEG insertion due to the late effect of radiotherapy. These patients occasionally have some radiation-induced problems that interfere with endoscopic examination, such as trismus or pharyngeal stricture. In our series, PEG was also performed for tube feeding in two patients with esophageal cancer and one with gastric cardiac cancer. It is an alternative to expensive metallic stent insertion. PEG is also an alternative to the nasogastric tube as a means of gastrointestinal decompression. Only two of our patients received PEG insertion for decompression due to cancerous peritonitis.

The reported success rate of PEG insertion is high, usually more than 95%.^{2,3,18} Our series also had a comparable success rate (97.4%). There are some situations that may interfere with PEG insertion. We attempted PEG insertion in eight patients with partial gastrectomy and were successful in five, but three patients had the tube puncture through the intestinal wall near the anastomotic site. Four patients with malignant or benign stricture received PEG insertion after endoscopic or radiologic guided dilatation. Ten patients with ventriculoperitoneal shunt received PEG insertion and were discharged smoothly. Schulman and Sawyer had reported a similar result in 2005.¹⁹ In our series, there were 19 patients with gastric ulcer, seven with gastric cancer and six with previous PEG or surgical gastrostomy wound that did not preclude PEG insertion.

PEG insertion was associated with some complications. The rate of major complications that cause significant morbidity is reported to range from 3% to 12%, including perforation, major

bleeding, aspiration pneumonia, and necrotizing fasciitis.^{2-4,7,20} There were 11 (3.6%) major complications in our series, and most were aspiration pneumonia. It was probably due to lack of adequate assistants for frequent suction of oropharyngeal secretion of the patients in supine position during the procedure. The minor complication rate is reported to range from 10% to 40% and varies with different definitions, including minor bleeding, wound infection, peristomal leakage, tube dysfunction, ileus, and complications associated with feeding.^{2-4,18,20} The 30-day post-PEG mortality rate in our series was 3.3%, which is lower than the 4.1–26.1% reported in the literature.^{2,4,21,22} It was probably because relatively few patients with CVA received PEG insertion in the acute stage and many of the patients with head and neck cancer received PEG insertion at a later stage after effective radiotherapy. From the literature, the mortality rate of patients receiving PEG insertion with comorbidities stabilizes 2 months later after the acute episode.^{22,23} So we would recommend PEG insertion for patients who require tube feeding for more than 3 months, otherwise nasogastric tube can provide a convenient route for short-term nutritional support.

Apart from endoscopic guidance, percutaneous fluoroscopic gastrostomy is another effective and safe approach for insertion of feeding tube.²⁴⁻²⁶ However, the inserted feeding tubes are usually smaller than that via the endoscopic route (12–18 Fr vs. 24 Fr). Most Taiwanese patients or caregivers prefer larger tubes for convenience of bolus feeding. Under rare circumstances, other modalities of examination can provide supplemental monitoring for facilitation of PEG insertion, including transabdominal ultrasonography,^{27,28} endoscopic ultrasonography,²⁹ computed tomography²⁸ and laparoscopy.³⁰

In conclusion, PEG is an effective method for tube feeding and drainage with a high success rate. PEG insertion is indicated for patients with dysphagia caused by CVA, head and neck cancer and Parkinsonism in Taiwan. It is a relatively safe procedure with a 3.6% rate of major complications and an 18.9% rate of minor complications.

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