CT-Guided Percutaneous Endoscopic Gastrostomy (PEG) Tube Replacement in a Post-Partial Gastrectomy Patient: A Pioneering Experience

Francisco CPD
Gopez-Cervantes JL
Co JT

Institute of Digestive and Liver Diseases
St. Luke's Medical Center-Global City
Philippines

Correspondence:
Dr. Carlos Paolo D. Francisco
carlosfranciscomd@yahoo.com

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Abstract

Background: Percutaneous endoscopic gastrostomy (PEG) provides effective long-term access for enteral feeding. One indication for PEG is inadequate enteral intake due to dysphagia secondary to a neoplasia or neurologic disorder. However, history of previous partial gastrectomy is considered a relative contraindication for PEG due to limited gastric remnant. Computed tomography (CT)-guided PEG is an alternative technique in cases where endoscopic placement is not ideal. *Objective:* To demonstrate the feasibility of PEG tube placement in post-gastrectomy patients. *Case Presentation:* An 84-year-old female who previously had partial gastrectomy with Billroth 2 anastomosis and who has had multiple hospitalizations due to recurrent pneumonia is presented. Initial endoscopic evaluation showed unremarkable esophageal and remaining proximal gastric mucosa with intact gastrojejunostomy anastomosis. Prior to puncture, identification by CT scan of the left pleura, diaphragm in the superior aspect of the stomach, and the anastomotic site between the stomach and jejunum was done. Guided by CT scan, PEG tube was inserted by pull-through technique under intravenous sedation and local anesthesia at the puncture site. Initiation of enteral feeding was tolerated without untoward event within 24 hours after the procedure. Full intermittent feeding was achieved on the fourth postoperative day. *Conclusion:* With this first-hand experience, we have shown the greater advantage of CT-guided PEG over endoscopy alone in a previous gastric surgery patient. Radiologic guidance provides better anatomic orientation, preventing accidental puncture of adjacent organs and reduces the risk of tube misplacement. CT-guided PEG is a safe alternative procedure prior to surgical tube placement.

Keywords: case report, percutaneous endoscopic gastrostomy, PEG tube, CT-guided, partial gastrectomy

Introduction

Percutaneous endoscopic gastrostomy (PEG) is the preferred feeding route in patients with functioning gastrointestinal (GI) tract requiring prolonged enteral nutrition but with contraindications to feeding per orem. It provides superior access to the GI tract and is favorable over surgical methods because of its lower cost and lesser risk of morbidity and mortality.[1] Main indications of PEG tube placement are nutritional support for inadequate enteral intake due to dysphagia, and for gastric decompression.[1,2] Some of the common conditions for which patients are referred for PEG include cerebrovascular disease, Parkinson's disease, dementia, head trauma, head and neck malignancies, esophageal cancer and critically ill patients in the intensive care.[1]

Although PEG tube insertion is simpler and less invasive compared to surgical gastrostomy, several complications may still occur. In a prospective study by Blomberg and colleagues, the common complications encountered within two weeks after PEG insertion were abdominal pain (13%), peristomal infection (11%), diarrhea (11%) and leakage (10%).[3] However, a single

intravenous dose of a broad-spectrum antibiotic given 30 minutes before PEG has been proven effective in reducing the incidence of peristomal infections.[4] In a meta-analysis by Jafri et al., penicillin-based prophylaxis should be the antibiotic of choice in preventing peristomal infections, with a relative risk reduction of 62% and absolute risk reduction of 13%.[5] Other reported complications include pneumoperitoneum, inadvertent tube removal, peritonitis, tube blockage, aspiration pneumonia, metastatic seeding and perforation. Mortality after PEG has also been documented but is usually due to the patient's underlying co-morbidities.[1]

PEG was first introduced in 1980 as an alternative to feeding tube placement by surgical methods. The pull-string method by Gauderer and Ponsky is the most widely used technique in PEG tube insertion. This method uses a string that is inserted through a needle with a plastic sheath in the abdominal wall into the stomach, grasped with an endoscopic snare and then pulled through the esophagus and mouth. Afterwards, the string is fixed to the external end of the feeding tube and the tube is pulled from the mouth to the esophagus, stomach and then out though the abdominal wall.[1,6,7]

In addition to endoscopic and surgical gastrostomy, feeding tubes can also be placed percutaneously, guided by fluoroscopy or computed tomography (CT) scan. These radiologically-guided gastrostomy can be done using either the push-type or pull-type method. Both procedures are completed after contrast injection in order to confirm correct intraluminal tube position and to exclude extravasation.[8,9]

The decision for PEG tube placement should be individualized, not only to improve the patient's survival and nutritional status, but also to improve quality of life. Patients should be carefully screened prior to PEG insertion. Failure of transillumination and inadequate indentation of the proposed site with a finger should constitute a contraindication to tube placement at that site.[10]

Absolute contraindications of PEG tube insertion include serious coagulation disorders, hemodynamic instability, sepsis, severe ascites, peritonitis, marked peritoneal carcinomatosis, history of total gastrectomy, gastric outlet obstruction, and lack of informed consent. On the other hand, conditions such as the presence of gastric varices, hepatomegaly, splenomegaly, non-obstructing oropharyngeal or esophageal malignancy, large hiatal hernia, and history of partial gastrectomy are considered relative contraindications.[1,11]

In cases where endoscopic placement alone is not successful, a combined endoscopic and radiologic approach may improve anatomic orientation and accuracy.[2]

To our knowledge, there is no local data available on CT-guided PEG tube placement in the Philippines. This case report discusses the successful utilization of CT scan in tandem with upper endoscopy for PEG tube insertion in a geriatric patient who previously had partial gastrectomy.

Case Report

An 84-year-old Filipino female was referred due to aspiration pneumonia. She has hypertension, chronic kidney disease, rheumatoid arthritis and a history of partial gastrectomy (Billroth 2) a decade ago for an unrecalled indication. For the past year, she had several consults due to recurrent episodes of pneumonia, sometimes requiring hospital admissions. Her baseline functional capacity was assisted with most activities of daily living. Feeding tube insertion was recommended; hence, referred to our subspecialty for PEG.

Pre-endoscopic whole abdominal CT scan with intravenous contrast showed wall thickening of the gastric remnant with its anterior wall measured to be 2.3 cm away from the anterior abdominal wall (**Figure 1A**), but without any intervening bowel loops in between. Esophagogastroduodenoscopy showed an unremarkable esophagus and the remaining 25 cm of the proximal stomach with intact gastro-jejunostomy anastomosis. The PEG site was identified by transillumination, finger indentation and CT scan guidance. A gauge 22 spinal needle was punctured from the skin to the stomach under CT scan as well as gastroscope guidance. Lidocaine was infiltrated at the target site followed by a one-centimeter percutaneous incision. A French 24 PEG tube was placed by pull-through technique. Second look endoscopy showed the mushroom tip of the PEG tube in place, anchored at three-centimeter level. Repeat whole abdominal CT scan confirmed the placement of the PEG tube and showed the tube traversing the left upper anterior abdominal wall with the tip within the stomach (**Figure 1B**). There was no evidence of pneumoperitoneum or

abnormal fluid collection post-procedure. Trial tube feeding was tolerated after 24 hours with full, intermittent feeding achieved after four days.

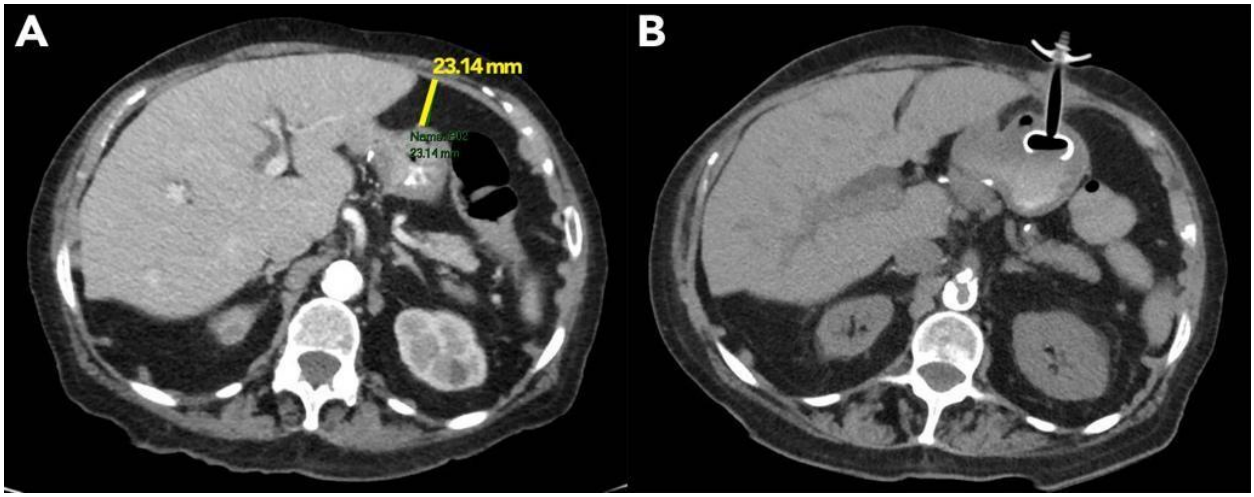

Figure 1. CT scan images. A: pre-PEG insertion. B: post-PEG insertion.

Discussion

PEG is a safe and well-tolerated procedure that provides effective long-term enteral feeding access for patients with inadequate nutrition who cannot tolerate oral intake because of malignant or neurologic conditions. Currently, it has more than 95% success rate when a safe site has been identified. Transillumination and adequate finger indentation of the proposed site are mandatory. Failure to fulfill these prerequisites should constitute a contraindication to PEG tube placement due to risk of organ injury.[12] Other contraindications of PEG include previous esophageal or gastric surgery, obesity, hepatosplenomegaly, peritoneal carcinomatosis, portal hypertension, peritonitis and gastric varices.[1,2]

Our patient was referred to the gastroenterology service for PEG tube insertion due to recurrent episodes of pneumonia from aspiration. In a study by Marumo et al., esophageal reflux of gastric contents and swallowing dysfunction were found to be the most important risk factors for aspiration pneumonia following gastrectomy.[13] Compared with nasogastric tube (NGT), PEG is associated with significantly lower incidence of aspiration pneumonia.[14] History of previous gastrectomy, however, has been described as a relative contraindication for PEG. This is due to the limited gastric remnant and the high posterior subcostal positioning of the stomach which prevents adequate approximation to the anterior abdominal wall.[15,16]

Performing PEG in a patient with partial gastrectomy requires skill and experience. In the study by Singh et al., a significantly longer procedure time was observed when PEG was done in a subtotal gastrectomy patient by a gastroenterologist with less experience compared with a gastroenterologist with more than ten years of experience (80 minutes vs. 20 minutes).[15]

CT-guided PEG is an alternative technique in cases where a purely endoscopic method of tube placement is not possible. It is a safe procedure done initially with acquisition of CT image slices to guide the choice of access prior to the endoscopic gastrostomy. The simultaneous endoscopy and CT guidance allows for an excellent anatomic orientation resulting in a reduced risk of tube mis-placement.[2] It has low risk of complications, which include pneumoperitoneum, aspiration, hemorrhage, perforation, wound infection and peritonitis. Post-insertion care includes adequate pain relief, daily wound care and regular flushing.[1]

This case is notable as CT-guided PEG represents an alternative technique for gastroenterologists in providing long-term enteral nutrition in patients for whom endoscopic method alone is difficult. Locally, there has been no published report yet documenting the use of this procedure. These findings therefore serve as a vital addition to the development of current

management of post-partial gastrectomy patients requiring long-term enteral feeding.

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Conflict of Interest

The authors declare no conflict of interest.

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