

Percutaneous endoscopic gastrostomy: A secondary care hospital experience

✉ Muhammer Ergenç,¹ ✉ Serhat Tolga Derici,¹ ✉ Tefvik Kıvılcım Uprak²

¹Department of General Surgery, Istanbul Sultanbeyli State Hospital, Istanbul, Turkey

²Department of General Surgery, Marmara University Faculty of Medicine, Istanbul, Turkey

ABSTRACT

Introduction: Percutaneous endoscopic gastrostomy (PEG) is the most common enteral feeding method in patients with swallowing disorders. PEG is a minimally invasive procedure, but acute and chronic complications may develop after the procedure. Therefore, in this article, we evaluated PEG interventions that were performed in a secondary care hospital.

Materials and Methods: We performed a retrospective observational study of patients who underwent PEG intervention from January 2019 to June 2021 at the Istanbul Sultanbeyli State Hospital Endoscopy Unit. This study was approved by the local Ethics Committee and registered with ClinicalTrials.gov (NCT05012527). A total of 45 patients' comorbidities, indications, complications, and 30-day mortality rates were analyzed.

Results: The majority of our population was elderly patients, and the mean age of the patients was 74. Most patients had multiple comorbidities such as hypertension, Alzheimer's disease, stroke, and diabetes mellitus. The minor complication rate was 24.4%, and the major complication rate was 4.4%. Thirty-day mortality was observed in 18% of this cohort.

Conclusion: Before the PEG procedure, the patient's general condition, the expected time of insufficient food intake, life expectancy, and comorbidities should be carefully examined. Our study has shown that PEG is a viable and safe procedure.

Keywords: Complications, gastric feeding tubes, gastrostomy, indication, outcome, percutaneous endoscopic gastrostomy, tube feeding

Introduction

Percutaneous endoscopic gastrostomy (PEG) is the most common method of enteral feeding in patients with dysphagia and a functional gastrointestinal (GI) system who are expected to be fed long-term enteral feeding.^[1-5]

Feeding with a PEG tube is a safe and effective method of providing long-term enteral nutrition, which is more advantageous than the nasogastric tube and has a lower com-

plication rate than radiological or surgical gastrostomy.^[2,3]

PEG is a minimally invasive procedure, but acute and chronic complications may develop after the procedure, and 30-day mortality after PEG has been reported as 3.3–23.9%. More data are needed to identify potential risk factors associated with acute complications, chronic complications, and 30-day mortality after PEG.^[2,6]



Received: 03.11.2021 Accepted: 08.11.2021

Correspondence: Muhammer Ergenç, M.D., Department of General Surgery, Istanbul Sultanbeyli State Hospital, Istanbul, Turkey

e-mail: muhammerergenc@gmail.com



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Therefore, in this article, we evaluated PEG procedures performed in our hospital. The study aims to analyze the indications, complications, and outcomes of PEG procedures.

Materials and Methods

We performed a retrospective observational study of patients who underwent PEG intervention from January 2019 to June 2021 at the Istanbul Sultanbeyli State Hospital Endoscopy Unit. This study was approved by the Marmara University Faculty of Medicine Clinical Research Ethics Committee (Number: 09.2021-724) and registered with ClinicalTrials.gov (NCT05012527).

Patients' endoscopy and hospital records were used for data acquisition. Patients with missing data and duplicate records, who only had a gastrostomy tube replacement, were excluded from the study.

The following parameters were analyzed: age and sex, comorbidity, examination date, indication, complications, overall survival, and the 30-day mortality rate after the procedure.

All interventions were performed using standard video endoscopes (Fujinon EG-530WR) by general surgeons with at least 5 years of experience in endoscopy. Twenty Fr PEG (Allwin Medical Devices) was used with the pull method for the procedure. The patients fasted for at least 8 h before the procedure. Almost all PEG procedures were performed under sedation with propofol 1% 10 mg/ml by an anesthetic technician under the supervision of an anesthesiologist. Continuous monitoring was provided by recording oxygen saturation, blood pressure, and pulse rate. A prophylactic antibiotic (2 g of intravenous cefazolin) was given if patients were not under antibiotic treatment.

The European Society for Clinical Nutrition and Metabolism (ESPEN) guideline classified PEG indications.^[6] Complications were reported according to the current practice in PEG.^[1]

The primary outcome of this study was to determine PEG indications, complications, and the 30-day mortality rate after the procedure.

Statistical Analysis

We performed statistical analysis using the Statistical Package for the Social Sciences (Version 24 for Mac, IBM Corporation). Descriptive data for continuous variables

are expressed as the mean and standard deviation. Frequencies procedure is used on categorical variables. Overall survival is the time from the start of primary treatment to the date of exit or last visit if the patient is still alive (months). The Kaplan–Meier method was used in survival analysis and the log-rank test was used in univariate analysis. The confidence interval for statistical significance will be accepted as 95% and a bilateral $p < 0.05$.

Results

From January 2019 to June 2021, 48 PEG interventions were performed at Istanbul Sultanbeyli State Hospital Endoscopy Unit. After exclusion criteria, 45 patients were analyzed.

The majority of our population was elderly patients, and the mean age of the patients was 74. Patient demographics are detailed in Table 1. The major indications for PEG were dementia and stroke. Detailed indications are given in Table 1.

Table 1. Patients' demographics and indications of percutaneous endoscopic gastrostomy

Percutaneous endoscopic gastrostomy	n	Percent %
Age (years)		
Minimum-Maximum	39-92	45
Mean- Std. Deviation	74.82-13.439	100
Sex		
Male	20	44.4
Female	25	55.6
Indications		
Cerebrovascular disease	14	31.1
Dementia	13	28.9
Parkinson's disease	6	13.3
Amyotrophic lateral sclerosis	3	6.7
Epilepsy	2	4.4
Cerebral tumor	2	4.4
Multiple sclerosis	1	2.2
Psychomotor retardation	1	2.2
Esophageal cancer	1	2.2
Achalasia	1	2.2
Prion disease	1	2.2
Total	45	100.0

Most patients had more than 1 comorbidity, and the most common hypertension, Alzheimer's disease, stroke, and diabetes mellitus were detected (Table 2).

The minor complication rate was 24.4%, and the major complication rate was 4.4% (Table 3). Five (11.1%) patients were treated with antibiotics because of the clinical infection signs at the site of PEG placement. Two inadvertent PEG removals were detected 78 and 82 days after PEG insertion, and replacement was performed using a silicone urinary catheter at the bedside. Two buried bumper syndromes occurred 27 and 44 days after PEG insertion, and the tubes were removed (Fig. 1). A retube was applied to another site of the abdominal wall.

The 30-day mortality rate was 18%, and eight patients died within 30 days of PEG insertion. However, mortality was related to patients' primary disease. The median follow-up was 5 months (0–36 months). Mortality was observed in 69% of patients during follow-up. The median survival time was 8 months (Fig. 2).

Discussion

PEG is a major part of nutritional support. It allows enteral nutrition in patients who cannot be fed orally but have a functionally digestive system.^[7] ESPEN and European Society of Gastrointestinal Endoscopy (ESGE) guidelines recommend that PEG feeding be considered if the patient's nutrient intake is expected to be inadequate for over 4 weeks.^[4,5,7] Both guidelines recommend the "pull" technique more than the "push" technique. All of our PEG experiences were by pull technique.

The main indications group of PEG that neurological diseases with dysphagia, malign or benign upper GI tract obstruction, and oncological diseases.^[7] In this study, neurological conditions were detected as major PEG indications. This result is compatible with other studies.^[2,3,8,9]

Contraindications of PEG placement include mechanical obstruction of the GI system (if the procedure does not apply for decompression), active peritonitis, uncorrectable

Table 2. Comorbidities of patients

Comorbidity	n	Percent %	Percent of Cases
Hypertension	19	19.8%	42.2%
Alzheimer's disease	12	12.5%	26.7%
Stroke	12	12.5%	26.7%
Diabetes mellitus	11	11.5%	24.4%
Dementia	8	8.3%	17.8%
Parkinson's disease	7	7.3%	15.6%
Chronic obstructive pulmonary disease	5	5.2%	11.1%
Epilepsy	4	4.2%	8.9%
Atrial fibrillation	3	3.1%	6.7%
Amyotrophic lateral sclerosis	3	3.1%	6.7%
Asthma	2	2.1%	4.4%
Psychosis	1	1.0%	2.2%
Myasthenia gravis	1	1.0%	2.2%
Schizophrenia	1	1.0%	2.2%
Multiple sclerosis	1	1.0%	2.2%
Prion disease	1	1.0%	2.2%
Achalasia	1	1.0%	2.2%
Tetraplegia	1	1.0%	2.2%
Hypothyroidism	1	1.0%	2.2%
Esophageal cancer	1	1.0%	2.2%
Peripheral arterial disease	1	1.0%	2.2%
Total	96*	100.0%	213.3%*

* Total numbers and percentages differ from the number of cases because patients have more than one comorbidity.

Table 3. Complications of percutaneous endoscopic gastrostomy

Complication	n	Percent %
Minor		
Wound infection	5	11.1
Stoma leakage	4	8.9
Inadvertent PEG removal	2	4.4
Major		
Buried bumper syndrome	2	4.4
None	32	71.1
Total	45	100.0

coagulopathy (recommends: Platelet count of >50 000/ μ L and an INR <1.5), and ongoing bowel ischemia.^[7] If the transillumination of the endoscopic light through the abdominal wall at the puncture area was not observed, a negative needle aspiration test (using a syringe containing 5 ml saline solution, puncture under continuous aspiration toward the air-filled stomach without prior air aspiration) could be use for PEG. Our patients had no previous upper abdominal surgery. And we had none unsuccessful PEG interventions.

Our minor complication rate was 24.4%, and wound infection was detected as the most common. The complication rate with PEG is reported to be between 10% and 45%.^[3,8-10] Intravenous administration of a single dose of beta-lactam antibiotic has been recommended (or suitable alternative antibiotic with allergic case) for post-procedure wound infection prophylaxis. Mild peristomal erythema is usually found, but we should consider infection if, besides erythema, there is a painful PEG site with induration



Figure 1. Axial image of the abdomen CT showing the buried internal bumper within the anterior abdominal wall (white arrow)

and purulent exudate with or without signs of systemic inflammation. Broad-spectrum antibiotics should be used for severe infections.^[11]

We performed two inadvertent PEG removal replacements at the bedside. Accidental removal of the PEG tube occurs commonly. Suppose the inadvertent removal of the tube occurs early (within 4 weeks of PEG insertion). In that case, the gastrocutaneous tract may not mature so that direct tube replacement may be unsafe without endoscopy or imaging guidance.^[10,12]

Two (4.4%) buried bumper syndromes occurred, and it was found to be higher than that in other studies.^[2,3,10,13] Other major complications were not detected. To reduce the risk of the buried bumper syndrome, daily tube mobilization (pushing inward) along with a loose position of the external PEG bumper (1–2 cm from the abdominal wall) recommends by the ESGE.^[11] After the results of this study, our awareness of this complication increased, and we started to pay more attention to these recommendations in PEG patients.

Most of our PEG patients had more than 1 comorbidity. The 30-day mortality rate was high. This result and the literature show that we should consider the 30-day life expectancy when selecting patients for PEG insertion.^[14-17] Although the mortality rate due to the procedure is low, care should be taken in patient selection due to the comorbidities and advanced age of the patient group. PEG procedure is not recommended, especially in hemodynamically unstable patients.

Our study has certain limitations. It is a retrospective, single-center, and low-volume study. Our center is a secondary care hospital. So might be that our patient population has a low morbidity rate related to low complication rates.

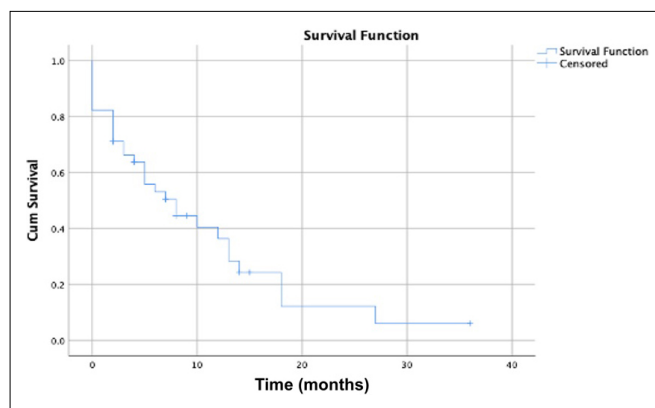


Figure 2. Overall survival curve of the patients.

Before the PEG, we should consider the patient's general condition, time of nutrient intake is expected to be inadequate, life expectancy, and comorbidities. The literature and our study show that PEG is a feasible and safe procedure.

Acknowledgments

The authors would like to thank Dr. Uygur Baştuğral and Dr. Çağlayan Deniz for their support, and also we are grateful to Nurse Gülendamar Bekdamar Karadeli on behalf of the endoscopy unit team.

Disclosures

Ethics Committee Approval: This study was approved by the Marmara University Faculty of Medicine Clinical Research Ethics Committee (Number: 09.2021-724) and registered with ClinicalTrials.gov (NCT05012527).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – M.E.; Design – M.E., T.K.U., S.T.D.; Supervision – M.E., T.K.U., S.T.D.; Data collection and/or processing – M.E., T.K.U., S.T.D.; Analysis and/ or interpretation – M.E., T.K.U., S.T.D.; Literature search – M.E., T.K.U.; Writing – M.E., T.K.U.; Critical review – M.E., T.K.U.

References

- Rahnemai-Azar AA, Rahnemaiazar AA, Naghshizadian R, Kurtz A, Farkas DT. Percutaneous endoscopic gastrostomy: indications, technique, complications and management. *World Journal of Gastroenterology*: WJG 2014;20:7739.
- Pih GY, Na HK, Ahn JY, Jung KW, Kim DH, Lee JH, et al. Risk factors for complications and mortality of percutaneous endoscopic gastrostomy insertion. *BMC Gastroenterol* 2018;18:101. [CrossRef]
- Vujasinovic M, Ingre C, Baldaque Silva F, Frederiksen F, Yu J, Elbe P. Complications and outcome of percutaneous endoscopic gastrostomy in a high-volume centre. *Scandinavian journal of gastroenterology* 2019;54:513–8. [CrossRef]
- Volkert D, Chourdakis M, Faxen-Irving G, Frühwald T, Landi F, Suominen MH, et al. ESPEN guidelines on nutrition in dementia. *Clinical Nutr* 2015;34:1052–73. [CrossRef]
- Weimann A, Braga M, Carli F, Higashiguchi T, Hübner M, Klek S, et al. ESPEN guideline: Clinical nutrition in surgery. *Clin Nutr* 2017;36:623–50. [CrossRef]
- Löser C, Aschl G, Hébuterne X, Mathus-Vliegen E, Muscaritoli M, Niv Y, et al. ESPEN guidelines on artificial enteral nutrition–percutaneous endoscopic gastrostomy (PEG). *Clin Nutr* 2005;24:848–61.
- Arvanitakis M, Gkolfakis P, Despott EJ, Ballarin A, Beyna T, Boeykens K, et al. Endoscopic management of enteral tubes in adult patients–Part 1: Definitions and indications. *European Society of Gastrointestinal Endoscopy (ESGE) Guideline*. *Endoscopy* 2021;53:81–92. [CrossRef]
- Çetin DA, Patmano M. Percutaneous endoscopic gastrostomy: Single-center experience. *Laparosc Endosc Surg Sci* 2020;27:84–7. [CrossRef]
- Sözüer E, Akyüz M, Dal F, Talih T, Gök M, Topal U. Our six years experiences about percutaneous endoscopic gastrostomy in surgical endoscopy unit. *Laparosc Endosc Surg Sci* 2020;27:78–83.
- Schrag SP, Sharma R, Jaik NP, Seamon MJ, Lukaszczyk JJ, Martin ND, et al. Complications related to percutaneous endoscopic gastrostomy (PEG) tubes. A comprehensive clinical review. *J Gastrointest Liver Dis* 2007;16:407–18.
- Gkolfakis P, Arvanitakis M, Despott EJ, Ballarin A, Beyna T, Boeykens K, et al. Endoscopic management of enteral tubes in adult patients–Part 2: Peri- and post-procedural management. *European Society of Gastrointestinal Endoscopy (ESGE) Guideline*. *Endoscopy* 2021;53:178–95. [CrossRef]
- Soliman Y, Kurchin A, Devgun S. 'Re-PEGing': an endoscopic approach to inadvertent early removal of PEG tube. *J Community Hosp Intern Med Perspect* 2020;10:194–8. [CrossRef]
- Kejariwal D, Aravinthan A, Bromley D, Miao Y. Buried bumper syndrome: cut and leave it alone!. *Nutr Clin Pract* 2008;23:322–4. [CrossRef]
- Strijbos D, Keszthelyi D, Gilissen LPL, Lacko M, Hoeijmakers JGJ, van der Leij C, et al. Percutaneous endoscopic versus radiologic gastrostomy for enteral feeding: a retrospective analysis on outcomes and complications. *Endosc Int Open* 2019;7:1487–95. [CrossRef]
- Janes SE, Price CS, Khan S. Percutaneous endoscopic gastrostomy: 30-day mortality trends and risk factors. *J Postgrad Med* 2005;51:23–8; discussion 8–9.
- Cano JJ, Thrift AP, El-Serag HB. Prospective implementation of algorithmic patient selection for gastrostomy tube placement consultations: a pre- and post-intervention analysis. *Clin Exp Gastroenterol* 2019;12:231–7. [CrossRef]
- Kobayashi K, Cooper GS, Chak A, Sivak Jr MV, Wong RC. A prospective evaluation of outcome in patients referred for PEG placement. *Gastrointest Endosc* 2002;55:500–6.