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Outcomes of Percutaneous Endoscopic Gastrostomy in Hospitalized Patients at a Tertiary Care Hospital in Turkey

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Abstract

BACKGROUND / OBJECTIVES—The aim of this study was to perform a retrospective analysis characterizing patients receiving tube feeding following percutaneous endoscopic gastrostomy (PEG) tube placement between 2004 and 2012 at Erciyes University Hospital in Turkey.

METHODS—Patients above the age of 18 years, who required long term enteral tube feeding were studied. All PEGs were performed using the pull-through technique by one experienced endoscopist. Demographic, clinical outcomes, and PEG-related complication data were collected.

RESULTS—Of the 128 subjects studied, 91 were male (71%) and 37 were female (29%). The mean age of this patient population was 54±19 years. The most common reason for PEG tube insertion was inability to consume oral diet due to complications of cerebrovascular disease (CVD; 27%), while cerebral hypoxia, occurring after non-neurological medical disorders, was the second most common indication (23%). A total of 70 patients (55%) had chronic comorbidities, with hypertension the most common (20%). The most common procedure related complication was insertion site bleeding, which occurred in 4% of patients. Long term complications, during one year were insertion site cellulitis, gastric contents leakage, and peristomal ulceration occurred in 14%, 5%, and 0.5% of patients, respectively. There were no PEG insertion-related mortalities; one-year mortality was unrelated to the indication for PEG tube insertion.
CONCLUSIONS—PEG tube insertion was a safe method to provide enteral access for nutrition support in this hospitalized patient population.

Keywords
PEG; gastrostomy; enteral nutrition; tube feeding; Turkey

INTRODUCTION
Percutaneous endoscopic gastrostomy (PEG) tube placement is most commonly performed for long-term enteral feeding access and/or gastric decompression.\(^1\) The PEG procedure was first described by Gauderer and colleagues in 1980 as an effective method of enteral feeding and as an alternative to surgical gastrostomy insertion.\(^2,3\) The most frequent indications for PEG include cerebrovascular disease (CVD), motor-neuron disease (MND), cancer, and trauma to the head and neck.\(^4–7\)

Among the techniques available for inserting a PEG, the “pull” method has been found to be the easiest and most commonly used.\(^8,9\) Surgically placed gastrostomy tubes tend to be associated with longer procedure times, longer post operative recovery times, higher costs, and an increased rate of development of complications as compared to PEG tubes.\(^10–12\) Over more than 30 years of use, PEG tube insertion has been found to be a relatively safe procedure; nevertheless, PEG tube insertion is associated with a procedure-related mortality rate of 0–2% and morbidity rate of 3–12%.\(^13,14,15\) Complications of PEG tube insertion can be divided into major and minor groups. Major complications include necrotizing fasciitis, buried bumper syndrome, bowel perforation, and gastrocolic or colocutaneous fistulae. Minor complications include wound infection/cellulitis, gastric contents leakage, bleeding, pneumoperitoneum, device dislodgement, accidental tube removal and tube blockage.\(^16–18\)

Our aim was to perform a retrospective analysis to characterize the demographics and PEG-related complications of adults receiving PEG tubes to enable enteral tube feeding between 2004 and 2012 at Erciyes University Hospital, a tertiary academic medical center in Kayseri, Turkey.

SUBJECT/METHODS
Study design and data collection
We performed a retrospective review of all adult patients who underwent PEG tube placement at our institution between 2004–2012. Approval for this study was granted by the Ethical Committee at Erciyes University Hospital. Patients who ≥18 years of age and required long term enteral nutrition due to medical and/or surgical conditions precluding adequate oral food intake, were studied. PEG tubes were not placed in patients with relative contraindications to placement, including those with severe ascites, peritonitis, peritoneal carcinoma, serious coagulation disorders (International Normalized Ratio >1.5, Quick test <50%, partial thromboplastin time >50 sec, or platelet count <50,000/mm\(^3\)), interposed organs (e.g. liver, colon), gastric outlet obstruction, previous gastric surgery, severe psychosis, clearly limited life expectancy and hemodynamic instability.\(^19\)
Individual chart reviews from the time of PEG insertion to the time of hospital discharge were performed. Data obtained from the medical records included demographic information, indications for PEG tube placement, sedative drugs used during the PEG tube insertion procedure, type of nutritional support received before the PEG, reason for PEG tube change, concurrent infections, PEG tube-related complications and mortality. Data on the administration of anti-coagulant, anti-platelet and antibiotic drugs following the PEG tube insertion were also recorded. PEG-related complications and mortality were recorded for a 12 month period after PEG tube placement.

**PEG procedure**

PEG procedures were performed either in the hospital endoscopy unit or at the patient’s bedside by experienced endoscopists. Patients were fasted for 12 hours before the procedure according to our current standard hospital protocol for PEG placement. Antibiotic prophylaxis was given according to the attending gastroenterologist’s preference. Anti-coagulant and anti-aggregant therapy was suspended prior to the PEG tube insertion procedure for some patients considered at high risk for bleeding complications. The PEG tube insertion was done under sedation using intravenous midazolam (Dormicum®, Roche, Istanbul) and propofol (Diprivan®, Astra Zeneca, Istanbul) and local anesthesia with prilocaine (Citanest®, Astra Zeneca, Istanbul). All non-intubated patients were given supplementary nasal oxygen; percent oxygen saturation and heart rate were monitored throughout the procedure. All PEG tubes were performed using the pull-through technique by one experienced endoscopist, assisted by a resident and nurse.

**Statistical analysis**

The Chi Square test was used to determine differences in deaths by one year after the insertion of the PEG tube as a function of the primary indication for the PEG. Statistical analyses were performed using IBM SPSS version 20.0. P-values of <0.05 were considered to be statistically significant.

**RESULTS**

Demographic data of the 128 patients included in the study are presented in Table 1. The mean age of this patient population was 54±19 years. The duration of parenteral and/or enteral nutrition support before PEG insertion averaged 38 days (range: 10–112 days). The majority of patients (51%) received nutrition via a nasogastric (NG) tube prior to PEG tube placement, while 33% and 14% were fed via parenteral nutrition and oral liquids, respectively. The most common indications for PEG tube placement were CVD (27%) and cerebral hypoxia occurring after non-neurological medical disorders such as ventricular fibrillation, cardiac arrest and carbon monoxide poisoning (23%; Table 1). Of the 128 patients studied, 60 (47%) were diagnosed with pneumonia, 8 (6%) with urinary tract infections, and 4 (3%) with catheter-related bloodstream infections during the hospitalization prior to PEG tube placement. A total of 70 patients had chronic comorbidities, with hypertension being the most commonly observed condition (20%). Prophylactic antibiotics were given to 7% of the patients who were not receiving additional antibiotics prior to the PEG procedure (Table 2). A total of 57 (45%) of the 128 patients
were breathing through a tracheotomy at the time of the procedure. Midazolam was the choice of sedation in 96% of the patients during the PEG tube placement, while 4% received propofol. A total of 16% of patients received acetylsalicylic acid (ASA) and 26% received low molecular weight heparin before the PEG tube insertion (Table 2) as a component of therapy for underlying disease states, but these were suspended as appropriate before the procedure.

The most common acute procedure-related complication was insertion site bleeding, which occurred in 4% of patients. Long-term complications during the one year following PEG insertion were insertion site cellulitis (14%), the most common such complication, and others as outlined in Table 3. The PEG tube had to be changed in 15 patients (12%) due to tube malfunction or dislodgement or gastric contents leakage (Table 3). A total of 20% of the 128 patients studied died within 28 days of PEG tube insertion, while 38% had died within one year of the PEG; one-year mortality was unrelated to the indication for PEG tube insertion (Table 4). Only 13% (17/128) of patients who were alive at one year were able to have their PEG tube removed and be fed completely by the oral route.

**DISCUSSION**

Multiple studies conducted over the last three decades suggest that PEG is a safe and effective means of providing long-term enteral nutrition.\(^1\text{–}^6\) A number of studies have demonstrated the effectiveness of enteral feeding using PEG tubes in in patients with CVD/hypoxia, dysphagia, head and neck cancer and head trauma\(^20\text{–}^30\). Our data adds to this information in a Turkish population of hospitalized adults with CVD, cerebral hypoxia, cranial trauma, head and neck cancers, and MND. The current study is the largest to date on PEG-related clinical outcomes of hospitalized patients in Turkey. Limitations include the study’s retrospective observational nature, the lack of comparative efficacy data on another PEG placement technique versus our institution’s standard methods described here, and the lack of data on the incidence of aspiration pneumonia, prior patient nutritional status, and enteral nutrition intake before and after PEG tube insertion.

Gencosmanoglu et al. conducted a retrospective study of PEG-related morbidity and mortality in Turkey involving 115 patients admitted to a neurosurgical intensive care unit; 60 were males and 55 females with the median age of 67 years.\(^31\) The age of the patients in our study was 54 years and the median age of our patients with neurological disorders was 64 years. Patients in the Gencosmanoglu study had procedure-related mortality, 30-day mortality, and overall mortality rates of 0%, 3.5%, and 17.4%, respectively.\(^31\) The overall 28 day (20%) and one year mortality (38%) in our patient population was higher than in their series, potentially due to a more heterogeneous critically ill patient mix. Gencosmanoglu et al. and we report one-year mortality rates as an index of the severity of underlying diseases in the population studied. In the Gencosmanoglu study, the PEG tube was able to be removed in 14% of patients and required changing in 10% patients; these rates are nearly identical to our study in which 13% patients were able to have the PEG tube removed and 12% required the PEG tube to be changed. In another retrospective Turkish study of 31 critically ill patients, 18 (58%) received enteral nutrition via nasogastric (NG) tube and 10 (32%) received parenteral nutrition (PN) prior to PEG insertion.\(^32\) In our study, the majority...
of patients (51%) received nutrition via a NG tube prior to PEG placement, while 33% were fed via PN. Ermis et al. conducted a retrospective study in 81 patients on PEG tube experience in Turkey.16 The most prevalent indication for PEG was neurologic disorders in 71 (92%) patients. PEG associated complications we observed in 14 patients (18%).18 In our patient population with similar clinical characteristics, PEG related complications occurred in 15 patients (12%).

Several studies have explored PEG-related complications including cellulitis/peristomal l infection; in 136 patients studied by Finocchiaro et al. (49% with cancer) only 4.4% developed a PEG site infection.31 while Zoef et al., in a prospective study of 390 patients (81% with cancer) found a peristomal infection rate of 34%.34 Zoef et al identified four risk factors were established as relevant for local infection after PEG: specific institution (OR 6.69; P = 0.0001), size of PEG tube (15 Fr versus 9 Fr; OR 2.12; P = 0.05), PEG experience of the endoscopist ( ≤100 vs. > 100 procedures; OR 0.54; P = 0.05) and the existence of a malignant underlying disease (OR 2.28; P = 0.019).34 Akkersdijk et al. and Gossner et al. found that using the pull technique plus prophylactic antibiotic use decreased procedure related complications and peristomal infection rates after PEG,35,36 In our study, at the time of the pull technique PEG procedure, a total of 62% of subjects were receiving antibiotics due to underlying infection or as prophylactic agents. The rate of insertion site infection in our study (14%) may thus be due to the experience of the gastroenterologists, use of antibiotics and/or the low prevalence of cancer in our study cohort. Routine antibiotic prophylaxis is not recommended in ESPEN artificial enteral nutrition guidelines19; prophylaxis was given to 7% of our patients and 55 % of the patients were already on antibiotics during the peri-procedural period. The remainder of the patients did not receive any antibiotic prophylaxis according to the operator’s choice.

CONCLUSION

In our tertiary care institution, PEG was a safe and effective way of providing access for long-term enteral nutrition. PEG tube placement for patients who cannot be fed orally is a minimally invasive procedure with low morbidity and mortality.

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### Table 1
Characteristics of 128 Patients Undergoing Percutaneous Endoscopic Gastrostomy (PEG) Tube Placement

| Patient characteristics                  | Total N (%) |
|------------------------------------------|-------------|
| Sex                                      |             |
| Female                                   | 37 (29)     |
| Male                                     | 91 (71)     |
| Age, mean (± SD) year                    | 54±19 (range 18–92) |
| Indication for PEG                       |             |
| Cerebrovascular disease                  | 34 (27)     |
| Non-neurological cerebral hypoxia        | 30 (23)     |
| Cranial trauma                           | 23 (18)     |
| Head and Neck cancer                     | 19 (15)     |
| Motor Neuron Disease (MS/ALS)            | 13 (10)     |
| Other                                    | 9 (7)       |
| Clinical Ward location                   |             |
| Neurology ICU                            | 37 (29)     |
| Medical ICU                              | 26 (20)     |
| Neurosurgery ICU                         | 22 (17)     |
| Anaesthesiology ICU                      | 10 (8)      |
| Ear, Nose and Throat ward                | 13 (10)     |
| Medical oncology ward                    | 6 (5)       |
| Other ward                               | 14 (11)     |
| Nutritional support route before PEG placement |       |
| Nasogastric tube                         | 65 (51)     |
| Total parenteral nutrition               | 42 (33)     |
| Oral liquid                              | 19 (14)     |
| Duodenal nasal tube                      | 2 (2)       |
| Major comorbid diseases                  |             |
| Hypertension                             | 25 (20)     |
| Diabetes Mellitus                        | 10 (8)      |
| Chronic Obstructive Pulmonary Disease    | 10 (8)      |
| Coronary Artery Disease/Arrhythmia       | 9 (7)       |
| Epilepsy                                 | 3 (2)       |
| Hyperthyroidism                          | 2 (1)       |
| Other                                    | 11 (9)      |

ALS= amyotrophic lateral sclerosis; ICU = intensive care unit; MS= multiple sclerosis
### Table 2

Concomitant drug usage

| Agent                                      | N (%) |
|--------------------------------------------|-------|
| **Antibiotic therapy**                     |       |
| Therapeutic use for prevalent infection    | 71 (55)|
| Prophylactic use for PEG placement         | 9 (7) |
| No antibiotics                             | 48 (38)|

| Anti-coagulant/anti-aggregant therapy      |       |
| Low molecular-weight heparin              | 33 (26)|
| ASA                                        | 20 (16)|
| Low molecular-weight heparin + ASA        | 18 (14)|
| Unfractioned heparin                      | 19 (15)|
| No anticoagulant                          | 38 (29)|

ASA = acetylsalicylic acid
## Table 3

### Complications of PEG tube placement

| Variable                              | N (%) |
|---------------------------------------|-------|
| **PEG changed**                       |       |
| Tube malfunction                      | 11 (8) |
| Gastric contents leakage              | 3 (2)  |
| Device dislodgement                   | 1 (0.5)|
| **Procedure complications with PEG placement** |       |
| Minor bleeding                        | 6 (4)  |
| Loop break down                       | 1 (0.5)|
| **Complications within one year after PEG placement** |       |
| Insertion site cellulitis              | 18 (14)|
| Gastric contents leakage              | 7 (5)  |
| Peristomal ulceration                 | 1 (0.5)|
| **Mortality within one year after PEG placement** |       |
| Dead due to underlying disease        | 49 (38)|
| Alive                                 | 79 (62)|
Table 4

28-day and one-year mortality

| Indications for PEG                  | 28-day mortality n (%) | One-year mortality n (%) |
|--------------------------------------|------------------------|--------------------------|
| Cerebrovascular disease              | 9 (36)                 | 12 (24)                  |
| Non-neurological cerebral hypoxia    | 3 (12)                 | 13 (27)                  |
| Cranial trauma                       | 5 (20)                 | 10 (20)                  |
| Head and Neck cancer                 | 3 (12)                 | 5 (10)                   |
| Motor Neuron Disease (MS/ALS)        | 4 (16)                 | 7 (14)                   |
| Other                                | 1 (4)                  | 2 (4)                    |
| **Total**                            | **25 (19.5)**          | **49 (38)**              |

P = not significant for one-year mortality as function of specific indication for PEG tube insertion (Chi Square test).