

Indications, One-Year Survival, and Complications of Percutaneous Endoscopic Gastrostomy: A Cross Sectional Study

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ABSTRACT

Background:

Providing ways for long-term feeding is essential for those who are not able to ingest. Percutaneous endoscopic gastrostomy (PEG) is a type of enteral feeding methods. The aim of this study was to evaluate the complications, indications, and one-year survival of this method in patients who underwent PEG.

Materials and Methods:

The cross-sectional study was carried out on 97 patients (census sampling) who had referred to Shahid Sadoughi Hospital in Yazd (Iran) for PEG tube placement in the period of March 2014 to March 2016. Data were collected using a researcher-made questionnaire and were analyzed using SPSS software version 18.

Results:

Cerebrovascular accident (CVA) was the most reason to refer to the hospital (52 cases, [%53.6]) followed by head and neck trauma (32 cases [33%]), head and neck tumors (6 cases, [6.2%]), ischemic encephalopathy (5 cases, [5.2%]), and burning (head trauma) (2 cases [1.2%]). Wound infection was observed in eight cases (8.2%), aspiration in three cases (1.3%), bleeding in three cases (3.1%), external leakage in two cases (2.1%), unplanned removal in two cases (2.1%), subcutaneous abscess in one patient (1%), and recurrent vomiting in one patient (1%). One year survival was measured 83.5%.

Conclusion:

PEG tube is a very convenient feeding method. Its complications are limited compared with its benefits and it is useful for patients who have trouble in ingestion for a long time. Early discharge from the hospital, especially the intensive care units, reduces costs and length of hospital stay.

Keywords: Enteral nutrition, Gastrostomy, Endoscopy, PEG tube, Complication

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INTRODUCTION

Providing appropriate feeding method is essential for patients who are unable of receiving oral intake because of an underlying condition. With malnutrition, patients' condition deteriorates and their problems are aggravated. Total intravenous feeding is one of these methods, which is the next priority of nutritional methods due to its costs and complications. Another way is enteral feeding, which is currently widely accepted by physicians and even by patients' families due to its low complications, low cost, maintaining the integrity of the immune system in the gut, taking advantage of micronutrients

and macronutrients, and easy maintenance (1).

With the introduction of percutaneous endoscopic gastrostomy (PEG) in the 1980s, an effective method was created for long-term enteral feeding. In this method, a flexible tube directs food from the outside into the stomach using endoscopic technique (2,3). This method has been accepted as a method of choice for nutritional therapy, because of its few complications compared with more invasive ones such as surgery. It also has a higher nutritional efficacy and fewer complications compared with nasogastric (NG) tube (4). No need for general anesthesia, less instrumentation, reduced hospital stay, and lower health care costs, made it a safe and widely used method (5).

The most common indication for using PEG is neurological impairment. Neurological dysphagia that usually occurs after stroke, by interfering with ingestion, has the highest share in the use of this feeding technique (6). Other indications include: mechanical pharyngeal and esophageal obstruction followed by tumors, lymph node invasion, and thyroid medullary cancers (7,8). Contraindications for this method include: critically ill patients, low life expectancy, severe cough, uncorrectable coagulopathy, distal enteral obstruction, recent myocardial infarction, portal hypertension with gastric varices, sepsis, ventral hernia, esophageal or pharyngeal obstruction, esophageal or oropharyngeal cancer (due to the potential seeding of the PEG tube with cancer cells), prior abdominal surgery, open abdominal wounds, gastroesophageal reflux disease (GERD), abdominal wall abnormalities, abdominal wall metastases, intra-abdominal organomegaly like splenomegaly and hepatomegaly, and severe ascites (9).

Long-term survival of patients in a persistent vegetable state has significantly improved by PEG tube insertion. Pulmonary infection has also decreased (10). Treatment tolerance in patients undergoing chemoradiotherapy for laryngeal carcinoma has increased with PEG tube and weight loss has been minimized (11). PEG tube can improve nutritional status in patients with various diseases such as neurodegenerative diseases (12), dementia (13), esophageal cancer (14), amyotrophic lateral sclerosis (15), and bullous pemphigoid (16).

Main complications of this method are classified into two categories: major and minor. Minor complications include: wound infection, tube leakage, stoma leakage, tube dislodgement, and tube blockage. Major complications include: gastric bleeding, gastric perforation, aspiration,

and buried bumper syndrome. Other complications can be peritonitis, gastrocolic fistula, subcutaneous abscess, food entry to the abdominal cavity, necrotizing fasciitis, and spreading gastric or esophageal tumor (17,18).

Currently, there is a growing trend for referrals to gastroenterology units for PEG tube placement. PEG tube placement is performed as outpatient in most centers. So it seems necessary to periodically evaluate this technique, and its complications and indications. In this study, we intended to evaluate the success of this method and identify the most common indications, various complications, and its one-year survival by investigating the patients who had referred to our gastroenterology unit for PEG tube placement.

MATERIALS AND METHODS

Study design and participants

This cross-sectional study was carried out on patients who had referred to Shahid Sadoughi Training Hospital of Yazd (Iran) for PEG tube placement in the period of March 2014 to March 2016. The sampling method was census. A total of 97 patients who consented to participate in this study, were included after signing a written informed consent.

Inclusion and exclusion criteria:

Patients, who were referred for PEG tube placement whose dysphagia lasted for at least a month, had a life expectancy of more than a month, and had no contraindications mentioned in the introduction, were included in the study. Those with pregnancy, severe ascites, gastroparesis, previous gastric resection, incurable gastric or pancreatic cancer, severe reflux, gastric outlet obstruction, uncorrected coagulopathy including (> 4 seconds elongation of prothrombin time (PT), platelets less than $50 \times 10^9/L$), and those who were dissatisfied were excluded from the study.

Procedure

All the processes related to PEG tube placement were done in Gastroenterology unit of Shahid Sadoughi Training Hospital of Yazd (Iran). Routine antibiotic prophylaxis were given to the patients as two grams of cephazolin (one gram 12 hours and one gram 6 hours before the procedure), while they were fast since 12 hours before. Intravenous injection of midazolam (Midamax, Tehran Chemie Pharmaceutical Co., Iran) and local anesthesia with lidocaine hydrochloride spray (Lignodic, Caspian Tamin Pharmaceutical Co., Iran)

Table 1: Baseline characteristics of the patients TPN: Total parenteral nutrition; NG tube: Nasogastric tube. Data are presented as frequency (percentage).

Characteristic	Year
Age	50/74 ± 22/5 (range 14 to 92)
Sex	Male: 65 (67%) Female: 32 (33%)
Previous abdominal surgery	Yes: 18 (18.6 %) No: 79 (81/4 %)
Previous feeding method	TPN: 5 (5/2 %) NG tube: 92 (94/8 %)

were used for preparation of PEG tube placement. Standard kit for PEG tube placement for all patients was Endovive 24 Fr, Boston Scientific Corporation, USA. To prevent distortion of the results and equality of the procedure, the entire processes were done by a single team, consisted of two experienced endoscopists, and trained assistants, and nurses.

Questionnaire:

The questionnaire used in this study consisted of five sections. The first part included demographic information such as name, age, sex, occupation, starting time of the underlying disease, and history of abdominal surgery. The second part was related to the underlying condition of the patient. The third part determined the previous method that the patient was fed up with. The fourth part was about the complications caused after receiving PEG tube, and finally patient's survival would be determined.

Data analysis

Data are presented as mean±SD for age and percentage for indications, complications, and survival. Statistical analysis was done using SPSS software version 18.0. P<0.05 was considered as statistically significant.

RESULT

Demographic information:

From March 2014 to March 2016 a total of 108 patients who were referred to Shahid Sadoughi Training Hospital of Yazd for PEG tube placement, were included in the study. Having considered the exclusion criteria, 11 patients were excluded from the study, out of whom five had previous extensive abdominal surgery, three were treated with anti-coagulants, two had severe ascites, and one had chronic

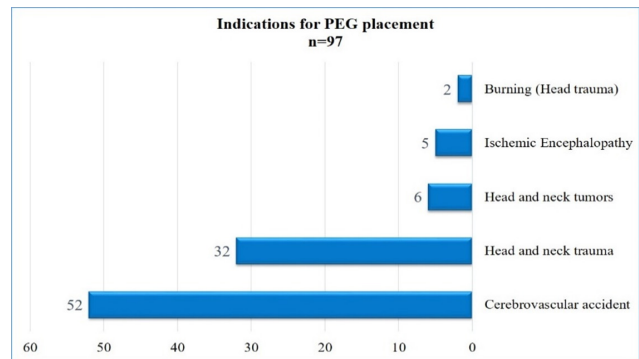


Fig.1: Indications for PEG tube placement. Data are presented as frequency.

severe cough. Finally, 97 patients were enrolled in the study and were followed-up for complications and one-year survival. They included 32 women (33%) and 65 men (67%). The mean age of the patients was 22.5±50.74 (range 14 to 92) years. PEG tube placement was successful in all the patients except in one case that two weeks after PEG tube placement, we had to remove it due to recurrent vomiting. Other patients benefited from this method until the end of the treatment period. Neither mortality nor complication was observed after PEG tube placement. The previous patients' feeding method was using NG tube in 92 cases (94.8%) and in the remaining 5 cases (5.2%), the method was total parenteral nutrition (TPN). Table 1 shows the patients' demographic data.

Indications:

Based on figure 1, which shows the distribution and frequency of the underlying diseases, cerebrovascular accidents (CVA) was the main reason for referral in 52% (53.6) of the patients. Head and neck trauma was the reason in 32 cases (33%), head and neck tumors in 6 cases (6.2%), ischemic encephalopathy in 5 cases (5.2%), and burnings (head trauma) was the reason in 2 cases (2.1%) who were referred to the hospital for PEG tube placement.

Complications:

Complications caused in these patients after PEG tube placement were generally observed in 20 cases (20.6%). Wound infection was observed in eight cases (8.2%), aspiration in three cases (3.1%), bleeding in three cases (3.1%), external leakage in two cases (2.1%), unplanned removal in two cases (2.1%), subcutaneous abscess in one patient (1%), and recurrent vomiting in one patient (1%). Figure 2 shows the related information.

Indications and Complications of PEG tube

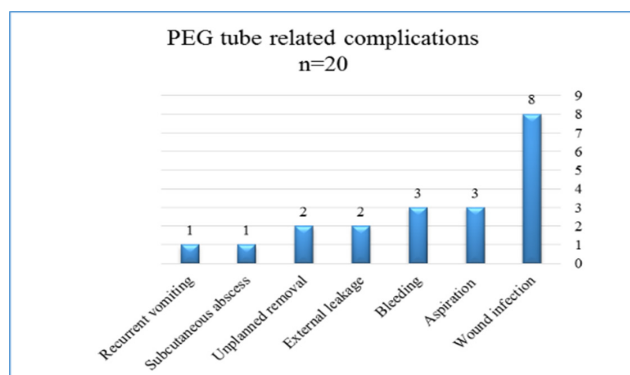


Fig.2: PEG tube related complications. Data are presented as frequency.

In table 2, complications after PEG tube placement were divided, based on the time of occurrence, into two categories: Early (less than a month) and Late (after a month). Out of the 20 complications, 10 patients suffered from early complications and 10 patients suffered from late complications.

One-year Survival:

No mortality was observed because of PEG tube placement. 16 patients (16.5%) died before one year, because of the underlying diseases and their progression. 81 patients lived more than one year. So, the one-year survival of the patients was calculated as 83.5%.

DISCUSSION

Maintaining adequate nutrition is considered as a very important objective in the management of many diseases (7). Currently application of PEG tube is known as a standard method for enteral feeding of patients. Many of these patients are old patients with CVA who have lost their ability of oral intake (19,20). If a patient needs long-term nutrition, the best option would be to use the PEG tube, because in addition to the privileges mentioned in the Introduction, the use of silicon material in the tubes stimulates the lowest reaction of the immune system and therefore, it can be used for long terms (21).

It should be noted that using bulking agents such as cholestyramine and psyllium should be avoided in this method. To avoid clogged tubes, the tubes should be washed every four hours with 30-60 mL water. The use of normal saline is not recommended due to the crystallization in the tubes (22). That is why in this study we recommended our patients to use water as tube irrigants.

Table 2: Early and late complications after PEG tube placement. Data are presented as frequency (percentage).

complications	Time		Total n (%)
	Early (< 1 month) n (%)	Late (> 1 month) n (%)	
Wound infection	6 (30%)	2 (10%)	8 (40%)
Aspiration	3 (15%)	0 (0%)	3 (15%)
Bleeding	0 (0%)	3 (15%)	3 (15%)
External leakage	0 (0%)	2 (10%)	2 (10%)
Unplanned removal	0 (0%)	2 (10%)	2 (10%)
Subcutaneous abscess	0 (0%)	1 (5%)	1 (5%)
Recurrent vomiting	1 (5%)	0 (0%)	1 (5%)
Total complications	10 (50%)	10 (50%)	20 (100%)

Although the success rate of PEG tube has been reported as more than 95% in similar studies, its complications are common. In our study, the success rate in the PEG tube placement was more than 98% and its related complications in general (early and late) were 20.6% and no procedure-related death was observed. Our finding was consistent with previous meta-analyses (23, 24).

Periostomal wound infection is considered as the most common complication (4-30%) in PEG tube method. The incidence of this complication is in the wide range of 8-47% (25-29). In this study, the rate of wound infection after PEG tube placement was only 8.2%, which can be due to the use of cephazolin prophylaxis on two separate occasions prior to each procedure. However, according to the European Society of Parenteral and Enteral Nutrition, the use of routine antibiotic prophylaxis in established hygienic conditions and required skills is not so necessary (30) but a meta-analysis conducted on randomized-controlled trials, which had analyzed a total of 1059 patients, showed that the use of antibiotic prophylaxis before PEG tube placement had a significant role in reducing wound infection (31). Although the incidence of wound infection in our study was low, it should be noted that it was the most frequent complications after PEG tube placement.

Aspiration is one of the major complications after PEG tube placement, which has risk factors such as old age, neurological disorders, supine position, and sedation. In this study, only three patients (3.1%) suffered from aspiration. All of them occurred before a month (early complication). However, aspiration usually occurs as a late complication after a long term home enteral nutrition (HEN) (32, 33). Review of medical records in these three cases showed that they all had at least two risk factors for this complication

i.e. old age and neurological disorders (CVA). This justifies that why this late complication occurred much sooner than it was expected (a month ago).

Therapeutic alternatives for nutrition other than PEG tube are using percutaneous fluoroscopic gastrostomy (PFG), NG tube, and surgical gastrostomy. PFG is used when the use of PEG is not possible. This method requires gastric distension, which is caused by blowing air into the stomach (34). Among the PFG complications, we can note the damage to the colon and gastroepiploic artery (35). That is why the use of computed tomography (CT) can provide more precise information about the position of the stomach and its surrounding anatomy such as the left hepatic lobe and the transverse colon. It should be noted that the use of CT, despite these benefits, impose more X rays and costs to the patient than endoscopy, but it reduces the risk of technical errors (36). NG tube is another method in which a thin tube is entered into the stomach through the nasal cavity to deliver foods. The method seems good as one of the first ways to deliver food to the stomach for short time, but it can neither deliver large foods to the stomach nor can it be used for a long time. In our study, 92 patients (94.2%) used NG tube before referral for PEG tube placement. Although some studies have concluded that it cannot be surely said that the use of percutaneous gastrostomy methods is better than NG tube (37), some authors believe that the use of percutaneous methods, due to lower intervention failure are safer and more effective than NG tube (38,39). Also, some recent studies have shown that using surgery is not much different than PEG in terms of complications and mortality (36) and is a safe, easy, and simple method (40), although using PEG tube can also be considered because it does not need overnight hospital admission, general anesthesia, and/or laparotomy. It can be done in a short time (less than 15 minutes for placement), has less tissue damage, and feeding can be started immediately after tube placement. The shortest period of using PEG tube in our study was a month that was for a patient with trauma who died one month after tube placement. The longest period for using it was 3 years, which the tube was replaced once and is still, being used.

Limitations:

One of the limitations in this study was the lack of detailed information of objective nutritional parameters and therefore its changes cannot be evaluated before and after PEG tube placement. Because Shahid Sadoughi Training Hospital in Yazd is considered as a referral center in central

and South East of Iran, many patients are not habitants of Yazd and follow-up of these patients was only possible through phone calls. This causes limitations in long-term follow-up and evaluation of various parameters related to their health status.

Suggestions

According to the study we performed, to further review of PEG tube method and compare it with other alternatives, it is suggested that future studies review the following categories:

1. Review and comparison of the complications and costs of surgical gastrostomy with PEG tube
2. Review and comparison of the complications and costs of N.G Tube with PEG tube
3. Review of early PEG tube placement in patients with indication and comparison of its costs and complications with its delayed placement (after one month)
4. Review of PEG tube placement on the quality of life of patients and its comparison with surgery

CONCLUSION

The results of this study show that the most indications for PEG tube placements are neurological diseases and CVA. The most frequent complication of this method in our study was infection in the site of tube entry to the skin. However, the complications of this method was small compared with its benefits and in patients who have long-term ingestion problem, it is a very convenient nutritional method with early discharge of patients from hospitals and particularly from intensive care units, leading to reduced complications, costs, and length of hospital stay. By training patients' relatives on how to treat and care the gastrostomy tube and wound site, especially in the first few weeks, the complications can be minimized.

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CONFLICT OF INTEREST

The authors declare no conflict of interests related to this work.

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