Assessment of Indications and other Parameters of Percutaneous Endoscopic Gastrostomy (PEG) Tube at Zagazig University Hospitals
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ABSTRACT

Background: Nutritional support to patients with inadequate oral intake is necessary to meet the metabolic requirements. Enteral feeding is superior to parenteral to keep the function and integrity of gastrointestinal system, So numerous disorders impairing or diminishing a patient’s ability to swallow may benefit from a PEG tube placement if a functional digestive system is present.

Aim and objectives: To evaluate indication and successful rates of PEG in patients as our goal is not only to improve the patient’s survival and nutritional status, but also to improve their quality of life which is not necessarily correlated with nutritional improvement.

Subjects and Methods: This retrospective, single-center study was done on 60 patients who needed PEG tube in the endoscopy unit of Internal Medicine Department, Zagazig University Hospital during the period from December 2020 to May 2021. All patients were subjected to complete evaluation before the study in the form of complete history taking, clinical examination, lab investigation, pelvi-abdominal U/S, multislice CT or MRI.

Results: The PEG insertion was successful in 58 (96.7%) patients while failed in two (3.3%) patients. The most common indications for PEG in our study group was stroke with bulbar symptoms or inadequate food intake due to disturbed conscious level (DCL) in 27 patients (45%) followed by cancer esophagus causing dysphagia and malnutrition in 11 patients (18.3%) then head trauma in 10 patients (16.7%) causing malnutrition due DCL.

Conclusion: PEG is a safe technique for providing enteral feeding in patients with poor oral intake more than 28 days who have a functional GI system.

Keywords: Percutaneous Endoscopic Gastrostomy Tube, Malnutrition, DCL
**Introduction**

The primary indication for enteral and parenteral feeding is the provision of nutritional support to meet metabolic requirements for patients with inadequate oral intake. Enteral feeding is usually the preferred method over parenteral feeding in patients with a functioning gastrointestinal (GI) system due to the associated risks of the intravenous route, higher cost and inability of parenteral nutrition to provide enteral stimulation and subsequent compromise of the gut defense barrier [1].

Gastric feeding is the most common type of enteral feeding. Access to insert the gastrostomy tube can be achieved by using of endoscopy, radiologically inserted [2] or surgical techniques [3].

Percutaneous endoscopic gastrostomy (PEG) is more effective and safe for enteral tube feeding in patients unable to ingest solid or liquid foods due to lost their deglutition reflex despite having preserved absorption and motility functions of the gastrointestinal tract [2].

The procedure was first described by Gauderer and Ponsky in 1980 and since then it has seen to have increasing use as a less invasive procedure than surgical gastrostomy [4].

Feeding by nasogastric tube is easy and cheap; however, there are many clinical studies citing PEG as a more comfortable technique due to low cost, less invasive, no need for general anesthesia in most cases and associated with fewer complications than nasogastric tube as irritation, ulceration, bleeding, esophageal reflux and aspiration pneumonia risks that decreased by PEG [4].

So PEG is considered to be a better choice for feeding tube than nasogastric tube in patients who require long term enteral feeding tube >30 days [5].

The most common indications for PEG placement are neurological such as cerebrovascular disease, bulbar dysphagia, mental retardation, dementia and head and neck cancer [6]. PEG tube can also be used in the treatment of gastric decompression [7].

Contraindications to PEG tube include serious coagulation disorders, hemodynamic instability, peritonitis, sepsis, infection of the site of access, distal GI obstruction (unless done for decompression), peritoneal carcinomatosis, a history of total gastrectomy, gastric varices, or organ interposition and in special conditions such as obesity, pregnancy or ascites [2].

Some patients, such as diabetes or older than 80 years of age, benefit less from PEG and the limited prognosis of patients with underlying or comorbid disease needs to be considered [8].
PEG is generally a safe procedure, although complications occur and their frequency is not negligible. They can be classified by severity (minor vs. major) or time of occurrence as endoscopy (procedure-related) and early or late post-procedural. Although the reported mortality related to PEG placement is low, it may be increased in patients with severe comorbidities [9].

Evaluation of PEG indications in patients at Zagazig University Hospitals were the goals of this study.

**Patients and Methods**

This retrospective, single-center study was done on 60 patients who needed PEG tube in the endoscopy unit of Internal Medicine Department, Zagazig University Hospital during the period from December 2020 to May 2021. Follow up for at least six months was done for every patient after PEG placement and the medical data of all patients were analyzed using the following parameters: indications, success of the tube placement, complications, and mortality. The included patients were aged 19-75 years old with confirmed indication for PEG tube insertion as cerebrovascular disease, bulbar dysphagia, retardation, dementia and head or neck cancer, etc., and without contraindication for enteral nutrition. We excluded patients who were pregnant or with tense ascites, gastroparesis, gastric outlet obstruction, previous subtotal or total gastrectomy or advanced cancer as cancer bowels and stomach or peritoneal metastasis.

**Methods:** All patients were subjected to complete relevant evaluation before the study in the form of complete history taking, clinical examination, laboratory investigation, pelvi-abdominal U/S & multislice CT or MRI to assess ascites, pregnancy, advanced cancer or peritoneal metastasis and endoscopic examination for outlet patency. PEG procedures were performed in the hospital endoscopy unit by experienced endoscopists assisted by a resident and nurse. Ponsky "Pull" technique is the standard method done.

Administrative considerations: Written informed consent was obtained from participants if possible or their relatives after clear explanation and the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University (Institutional Research Board “IRB”). The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

**Statistical analysis:** The data was coded, entered, and analyzed using Microsoft Excel software throughout the history, clinical examination, laboratory investigations, and outcome measures. The data was tabulated and analyzed using SPSS (statistical package for social science). Student's t-test was used to compare between two groups of normally distributed variables while Mann-
Whitney U Test is a statistical test for comparing two groups with quantitative variables that do not have a normal distribution. The Chi-square test (X²) or fisher was performed to compare and correlate two qualitative variables. The results were considered statistically significant and highly statistically significant when the significant probability (P value) was < 0.05* and < 0.001** respectively.

Results
In all 60 patients who received PEG, it was found that the majority of cases 27 (45.0%) patients were in the age group ≥ 60 years, while 25 (41.7%) patients between 40 and 59 years, 7 (11.7%) patients were between 20-39 years old and only one patient were less than 20 years. The age of patients ranged from 19 to 75 years with mean age ±SD being 56.53± 13.43 years Fig (1).

Regarding gender, 38 (63.3%) patients were male while 22 (36.7%) patients were female Fig (2). As regards history of chronic diseases, 36 (60%) patients had history of DM, 33 (55%) patients had hypertension, 10 (16.7%) patients had AF, and 5 (8.3%) patients had history of COPD, hepatitis C and CKD. None of patients had history of pulmonary disease Fig (3).

PEG tube insertion was done in all patients under sedation using intravenous midazolam and propofol as cleared in Table (1). While table (2) showed that PEG insertion was successful in 58 (96.7%) patients while failed in two (3.3%) patients.

Table (3) showed that the most common indications for PEG in our study group was stroke with bulbar symptoms or poor food intake due to disturbed conscious level (DCL) in 27 patients (45%) followed by cancer esophagus causing dysphagia and malnutrition in 11 patients (18.3%) then head trauma 10 patients (16.7%) causing malnutrition due DCL. The least indication reported was mechanical dysphagia resulted from Post cervical fixation by plates and screws in one patient (1.17%) and tracheoesophageal fistula causing recurrent aspiration in one patient (1.7%).

Fig (4) showed that PEG tube related complication was 16 patients (26.67 %) divided into minor and major groups. Major complications were buried bumper syndrome was found in one patient (1.7%) and massive hematemesis & melena in one patient (1.7%). The minor complications were wound infection (8.3%) followed by cellulitis (3.3%) then ilieus (3.3%) unintentional tube dislodgement (1.7%) and tube leakage (1.7%).
**Figure (1):** Bar chart showing age distribution in the study group.

**Figure (2):** Pie chart showing gender distribution in the study group.
**Figure (3):** Bar chart showing distribution of chronic diseases in the study group.

**Table (1):** Type of anesthesia used in the study group:

<table>
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<th>Parameters</th>
<th>Study group(n=60)</th>
</tr>
</thead>
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<td>Anesthesia</td>
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<td>IV Midazolam &amp; Propofol</td>
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</table>
### Table (2): Insertion of tube in the study group:

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</thead>
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<td>Insertion</td>
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<td>Failed</td>
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<tr>
<td>successful</td>
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### Table (3) Diagnosis for PEG indications in the study group:

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<tr>
<td>Hemorrhagic stroke</td>
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</tr>
<tr>
<td>Ischemic stroke</td>
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</tr>
<tr>
<td>Head &amp; neck cancer</td>
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<tr>
<td>Cricoid cancer</td>
<td>1</td>
</tr>
<tr>
<td>Laryngeal cancer</td>
<td>2</td>
</tr>
<tr>
<td>Retromolar squamous cell carcinoma</td>
<td>2</td>
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<tr>
<td>Post cancer tongue</td>
<td>1</td>
</tr>
<tr>
<td>Head trauma</td>
<td></td>
</tr>
<tr>
<td>Brain shot gun</td>
<td>2</td>
</tr>
<tr>
<td>Accident</td>
<td>1</td>
</tr>
<tr>
<td>RTA</td>
<td>7</td>
</tr>
<tr>
<td>Mechanical dysphagia (post cervical fixation plate &amp; Screws)</td>
<td>1</td>
</tr>
<tr>
<td>Neurological dysfunction (MS)</td>
<td>3</td>
</tr>
<tr>
<td>Tracheoesophageal fistula (recurrent aspiration pneumonia)</td>
<td>1</td>
</tr>
</tbody>
</table>
Discussion
Since the introduction of PEG by Gauderer and Ponsky in the early 1980, it has gained widespread acceptance in comparison to surgical gastrostomy as it is cheaper and with lower morbidity and mortality [10].

With complications of long standing nasogastric tube usage as irritation, ulceration, bleeding, esophageal reflux and aspiration risks [11], PEG tube is considered to be a better choice for feeding tube than nasogastric tube in patients who require long term enteral feeding tube >30 days [5].

In the current study PEG tube insertion was done in all 60 patients under sedation using intravenous midazolam and propofol. The insertion was successful in 58 (96.7%) patients while failed in two (3.3%) patients. In our aborted procedure, one of them due to cancer esophagus that totally occluded the lumen hindering further scope passage and the other patient failed due to diffuse laryngeal cancer with failed intubation of endoscope into esophagus.

Figure (4): Bar chart showing PEG complications in the study group.
In comparison to retrospective analysis between January 2005 and October 2012 by Nenad Vanis et al. [12] have been reported for PEG, a total of 366 PEG procedures were performed of which 359 tubes were successfully inserted recording success rates greater than 95%. In 7 patients PEG insertion failed due to anatomical anomaly or malignant GI obstruction.

In the current study, stroke with bulbar symptoms or poor oral intake due to disturbed conscious level (DCL) was the most common indications for PEG in 27 patients (45%) followed by cancer esophagus causing dysphagia and malnutrition in 11 patients (18.3%) then head trauma suffering from malnutrition due to DCL in 10 patients (16.7%) then head and neck cancer in 7 patients (11.7%). Similarly, Miroslav et al. [13] concluded that stroke was the most common indication in group of patients (22.8%).

In a study concluded by Milena Di Leo et al. [14] in Italy, the authors reported the most common indications of PEG tube insertion were dysphagia due to stroke in 33%, neurological disease in (22.1%) , cancer in (17.8%) , dementia in (14.3%).

While in retrospective study concluded by Miroslav et al. [13] in Sweden patients were divided into 4 groups according to PEG indications in total, PEG was inserted in 495 patients during the study period; 56% male, mean age at insertion was 67 years (range 19–95). Most patients belonged to the neurologic group (52%), followed by the oncologic (32%), another diagnosis (9%) and trauma (7%).

As regard study conducted by Ermis et al. [15] estimate complications rate after long-term follow-up of patients undergoing percutaneous endoscopic gastrostomy for a year and demonstrated an (18%) rate of adverse events. Also, Gundogan et al. [16] recorded complications rates ranging between 19-31% depending on many risk factors like size of PEG tube, experience of the endoscopist and the existence of a malignant and other underlying diseases.

Comparing these results to the current study, the complications reported was 16 patients (26.67 %) classified to fourteen patients (23.3 %) had minor complications while two patients (3.3 %) had major complications.

Wound infection after placement of PEG tubes was the most commonly reported complication although it was generally minor in nature. In this study, incidence of wound infection was found to be (8.3%) followed by cellulitis in (3.3%). This did not differ from previous studies conducted by Vizhi et al. [17] confirming its high prevalence (21.9%) especially in the acute postprocedural period.
As regard the study conducted by Vizhi et al. [17] the authors identify many risk factors to infection includes obesity, diabetes mellitus, hypoalbuminemia and chronic steroid therapy poor nutritional status, duration of hospital or ICU stay, previous exposure to radio-chemotherapy before PEG insertion.

In our current study we proved that the patient comorbidities may affect PEG tube insertion site increasing risk of infection and its management especially diabetic patient. As regard our cases there were 36 (60%) patients had history of DM, 33 (55%) patients had hypertension, 18 (30%) patients had cardiac diseases, 5 (8.3%) patients had history of COPD, 5 (8.3%) patients had history of hepatitis C, 5 (8.3%) patients had history of CKD and 1 (1.7%) patient was ESRD.

Despite routine antibiotic prophylaxis is not recommended in ESPEN artificial enteral nutrition guidelines [16]. All cases of tertiary center retrospective study in PEG-related adverse events after insertion received prophylactic antibiotics, as per hospital protocol, in the form of a single dose of ceftriaxone 2 g intravenously on the day of PEG insertion [18].

The administration of prophylactic antibiotics prior to PEG placement reduces the risk of infection. Several trials have demonstrated the benefit of a single, broad-spectrum antibiotic immediately prior to PEG placement [19].

Among the major adverse events 2 cases was documented in our study, buried bumper syndrome was found in 1 case only (1.7%) and massive hematemesis & melena in 1 case only (1.7%). This did not vary from the previously reported incidence of 0.3-2.4% [20].

Bleeding secondary to PEG placement can likely occur due to injury to the anterior abdominal wall and adjacent vessels, liver, oesophagitis, gastritis, ulceration or traumatic erosions of the gastric mucosa [21].

While in our study we had discovered that gastric ulcer was the cause of GI bleeding resulting from pressure necrosis caused by the tube on gastric mucosa.

Buried bumper syndrome (BBS) represents a severe complication, occurring in 0.3-2.4% of patients as a consequence of excessive tension of the tissue between the external and internal bumpers, leading to ischemic necrosis of the gastric wall and subsequent migration of the tube toward the abdominal wall [22].
Andrea Anderloni et al. [23] included in his study that was carried out in 356 patients underwent PEG placement, complication and mortality incidences were 4.8% and 5.2%, respectively, his data confirmed that it is a safe procedure and mortality was not related to the procedure itself but due to underlying disease and comorbidities.

Our results confirmed the practicalities of inserting PEG tubes under intra-venous sedation in elderly patients with multiple co-morbidities. Minor complications are common and although major complications are rare, the outcome is grim in these patients with multiple co-morbidities. In view of the potential morbidity, patients considered for PEG feeding should have reasonable prognosis. It is inappropriate in patients with rapidly progressive and incurable diseases.

**Conclusion**

From all the above mentioned data we can conclude PEG is as a safe technique and has gaining world-wide acceptance for providing enteral feeding in patients with poor oral intake more than 28 days who have a functional GI system. PEG tube placement has many indications mostly at stroke with bulbar symptoms, and is the recommended tube type if not contraindicated. The pull technique is the most commonly used, but other techniques are possible or even necessary in certain situations. Knowing when and how to place PEG tubes, as well as how to manage and even remove them, is an important part of the management of many patients.

**Conflicts of interest:** None.

**References**


