

Complications of Percutaneous Endoscopic Gastrostomy (PEG) Tube Applied to Endoscopy Unit Patients

Samir Abdel Azim Morsy Afifi, Ihab Fawzy Abdel Aziz,
Ahmed Kamal Soliman*, Marwan Nabil Elgohary

Department of Internal Medicine, Faculty of Medicine, Zagazig University, Egypt

*Corresponding Author: Ahmed Kamal Soliman, Email: doc_ak_91@yahoo.com

ABSTRACT

Background: In patients who find difficulty in eating or who have lost the ability to swallow food, percutaneous endoscopic gastrostomy (PEG) is the preferred method of long-term tube feeding. Although PEG is a usually safe technique, several complications sometimes arise.

Objective: To study the advantage and disadvantage of PEG to improve the maneuver and increase the success rate by identification of outcome complications of PEG and their management and evaluation of the efficacy of PEG in improving patient's lifestyles.

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. All patients were subjected to complete relevant evaluation before the study in the form of complete history taking, clinical examination, lab investigation, pelvi-abdominal ultrasound, multislice CT or MRI to assess advanced cancer or peritoneal metastasis and endoscopic examination for outlet patency.

Results: A total of 16 patients (26.67 %) had PEG-related complications. Fourteen (23.3 %) patients had minor complications. The most common minor complication recorded was insertion site infection that found in 5 (8.3 %) patients. Two (3.3%) patients in our study reported major PEG-related complications. One (1.7%) patient had massive hematemesis and melena and one (1.7%) patient reported buried bumper syndrome.

Conclusion: We concluded that PEG had received global acceptability as a safe approach for administering enteral feeding in patients with inadequate oral intake for more than 28 days and a functioning GI system.

Keywords: Complications, Endoscopy, Gastrostomy, PEG.

INTRODUCTION

In order to meet the metabolic needs of those who are unable to eat normally, enteral and parenteral feeding is the primary rationale. Enteral nutrition is preferred over parenteral nutrition in patients with a functioning gastrointestinal system due to the risks, costs, and incapacity of parenteral nutrition to provide enteral stimulation and thereby erode the gut defense barrier ⁽¹⁾.

The most prevalent enteral feeding method is gastric feeding. Endoscopy, radiologically placed tubes, and surgical procedures can all be used to get access to the gastrostomy tube. PEG (percutaneous endoscopic gastrostomy) is the preferred approach for long-term tube feeding in patients who are unable to eat or who have lost their deglutition reflex. PEG gives continuous nourishment through a tube put into the stomach ⁽²⁾.

Nasogastric tube feeding is simple and inexpensive; however, many clinical studies have found that PEG is a more comfortable technique due to its low cost, minimal invasiveness, in most circumstances, there is no requirement for general anesthesia and lower risk of adverse outcomes like aspiration pneumonia, ulceration, irritation, esophageal reflux, as well as bleeding. The use of a long-term enteral feeding tube for more than 30 days is recommended for certain

individuals. So PEG is regarded to be a superior option than a nasogastric tube ⁽³⁾.

Cerebrovascular illness, bulbar dysphagia, mental retardation, dementia, and head and neck malignancy are the most prevalent indications for PEG insertion. Gastric decompression can also be treated using a PEG tube. Contraindications to utilizing a PEG tube include severe coagulation problems, hemodynamic instability, sepsis, infection of the access site, distal gastrointestinal blockage (unless this is done for decompression), and peritoneal carcinomatosis. Obesity, pregnancy, or ascites are examples of unique circumstances ⁽²⁾.

PEG is less effective in some individuals, such as those with diabetes or those over the age of 80, while also taking into consideration the limited prognosis of patients with underlying or concurrent disease. Although PEG is a usually safe technique, problems sometimes arise and their incidence is not significant. They are characterized as endoscopic (procedure-related) and early or late post-procedural by severity (minor vs. major) and time of occurrence (early or late post-procedural). Although PEG-related mortality has been observed to be minimal, it may be higher in individuals with significant comorbidities ⁽⁴⁾.



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The aim of the present study was to study the advantage and disadvantage of PEG to improve the maneuver and increase the success rate by identification of outcome complications of PEG and their management and evaluation of the efficacy of PEG in improving patient's lifestyles.

PATIENTS AND METHODS

From December 2020 to May 2021, at Zagazig University Hospital's endoscopy unit 60 patients who required a PEG tube were involved in this retrospective, single-center study. Every patient had 6 months minimum follow-up after PEG placement and the medical records of all patients were analyzed using the following parameters: indications, success of the tube placement, complications, and mortality. The included patients aged 19-75 years old, of life expectancy more than 3 months 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, lab investigation,

pelvi-abdominal ultrasound and 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 was the standard method done.

Ethical considerations:

The Research Ethical Committee of the Faculty of Medicine, Zagazig University (Institutional Research Board "IRB") accepted the study after receiving written informed permission from participants or their family following a detailed explanation. When conducting human studies, the work was done in conformity with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical Analysis

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for the Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Qualitative data were represented as frequencies and relative percentages. Quantitative data were expressed as mean \pm SD (Standard deviation), median, and interquartile range.

RESULTS

Table (1) shows the demographic characteristics of the study group.

Table (1): Demographic characteristics in the study group

Parameters		Study group (n=60)	
		n	%
Age (years)	Mean± SD	56.53± 13.43	
	Median (IQR)	58.5 (53.0 - 66.0)	
	Range	19- 75	
	≤ 20 years	1	1.7%
	20-39 years	7	11.7%
	40-59 years	25	41.7%
	≥ 60 years	27	45.0%
Gender	Male	38	63.3%
	Female	22	36.7%
History of DM	No	24	40.0%
	Yes	36	60.0%
History of hypertension	No	27	45.0%
	Yes	33	55.0%
History of cardiac disease	No	42	70.0%
	AF	10	16.7%
	HF+AF	1	1.7%
	ICM	1	1.7%
	ICM+AF	1	1.7%
	IHD	3	5.0%
	IHD +AF	1	1.7%
	Moderate MS	1	1.7%
History of chest disease	No	55	91.7%
	COPD	5	8.3%
History of chronic liver disease	No	55	91.7%
	HCV	5	8.3%
History of chronic kidney disease	No	54	90.0%
	CKD	5	8.3%
	ESRD	1	1.7%
History of old CVS	No	51	85.0%
	Once	7	11.7%
	Twice	2	3.3%
History of other Previous diseases	No	41	86.3%
	Head shot gun	1	1.7%
	hypothyroidism	4	6.7%
	Lung abscess	1	1.7%
	M.S	3	5.0%
	Obese	1	1.7%
	P.U	1	1.7%
	pelvic shot gun	1	1.7%
	Post CA breast	1	1.7%
	Prosthetic valve	1	1.7%
Smoking	5	8.3%	

Figure (1) shows that the most common indications for PEG in our study group were stroke with bulbar symptoms or malnutrition due to disturbed conscious level (DCL).

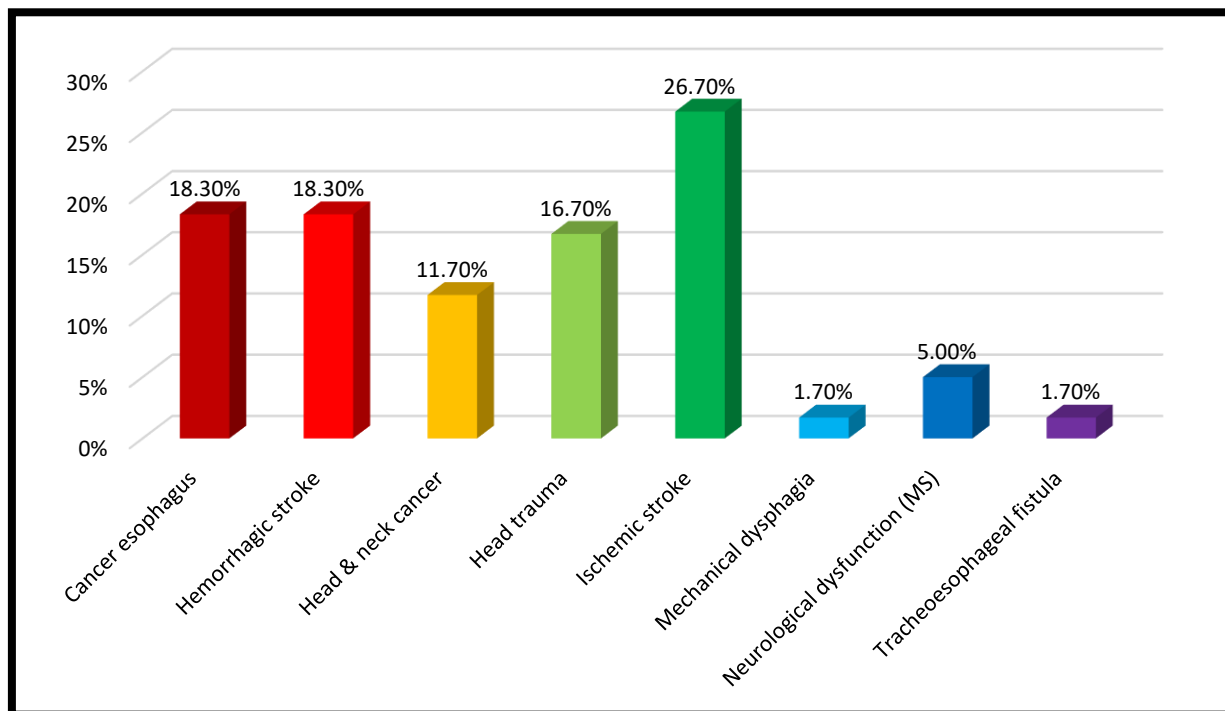


Figure (1): Distribution of indications for PEG in the study group

Table (2) shows the laboratory data of the study group.

Table (2): Laboratory data recorded in the study group

	Study group (n=60)				
	Mean	SD	Median	IQR	
				25 th percentile	75 th percentile
HB	10.43	2.15	9.85	8.65	11.80
PLTs	269.88	17.32	264.50	184.50	375.50
WBCs	9.91	2.31	8.61	5.81	12.55
INR	1.35	0.23	1.37	1.15	1.54
AST	78.10	10.49	45.00	28.00	88.00
ALT	82.68	20.60	42.00	27.00	65.00
Total Bilirubin	1.35	0.28	1.23	1.00	1.68
Direct Bilirubin	0.62	0.01	.42	.20	.85
Albumin	3.00	0.77	2.97	2.40	3.30
BUN	42.54	3.75	28.50	18.00	56.00
Creatinine	1.68	1.74	1.27	.85	1.77
Na+	137.83	6.13	139.00	132.00	143.00
K+	4.20	0.72	4.20	3.60	4.80

SD= standard deviation, IQR: interquartile range

PEG tube insertion was done in all patients under sedation using intravenous midazolam and propofol as cleared in **table (3)**.

Table (3): Type of anesthesia used in the study group:-

Parameters		Study group(n=60)	
		n	%
Anesthesia	IV midazolam and propofol	60	100%

Table (4) shows that a total of 16 (26.67 %) patients had PEG-related complications. The most common minor complication recorded was insertion site infection. Two (3.3%) patients in our study reported major PEG-related complications. One (1.7%) patient had massive hematemesis and melena and one (1.7%) patient reported buried bumper syndrome.

Table (4): Complications reported in the study group

Parameters		Study group (n=60)	
		n	%
No Complications	No Complications	44	73.33%
Complications	Minor complications	Desaturated during endoscopy	1 1.7%
		Ileus	2 3.3%
		Insertion site cellulitis	2 3.3%
		Insertion site ulcer	1 1.7%
		Insertion site infection	5 8.3%
		Tube dislodgement	1 1.7%
		Tube leakage	1 1.7%
		Tumor totally occludes lumen	1 1.7%
	Major complications	Massive hematemesis and melena	1 1.7%
		Buried Bumper syndrome	1 1.7%

As shown in **figure (2)**, the PEG insertion was successful in 58 (96.7%) patients while failed in two (3.3%).

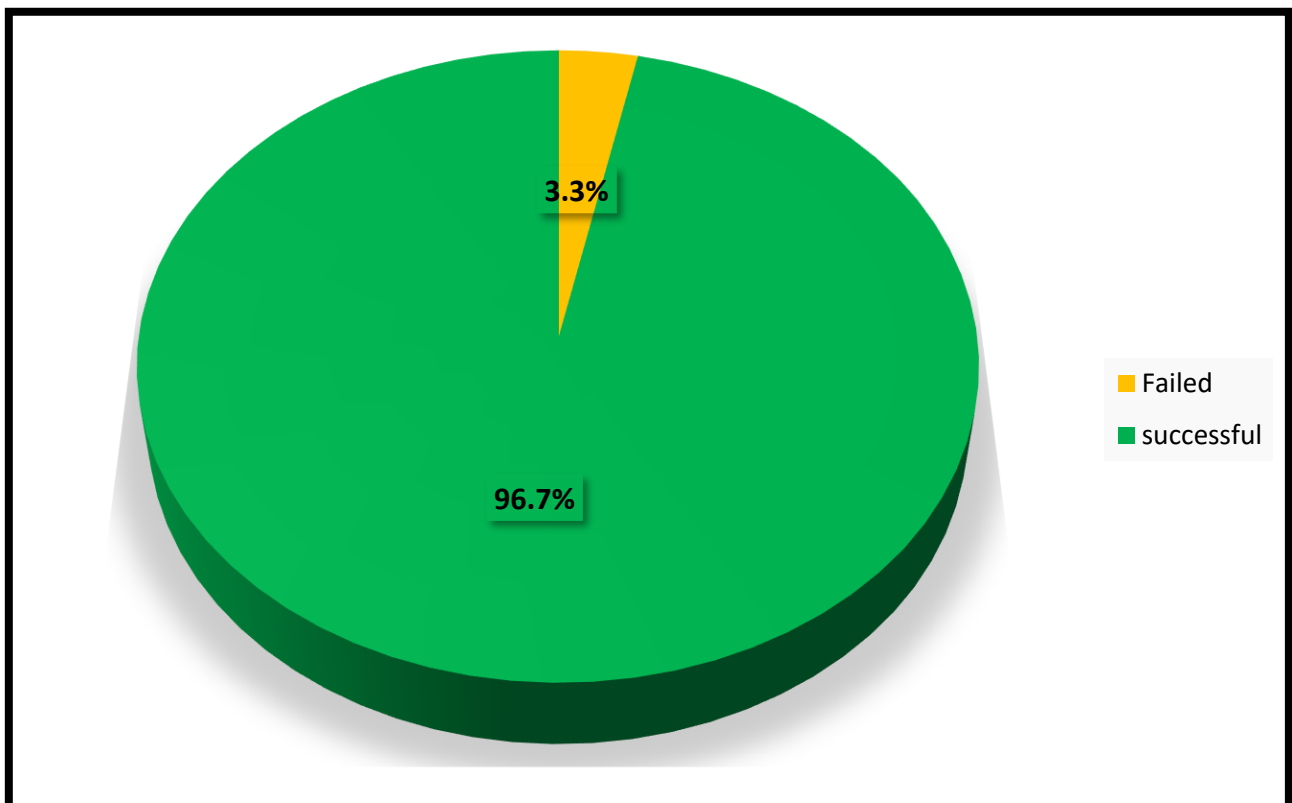


Figure (2): Results of percutaneous endoscopic gastrostomy (PEG) insertion in the study group

DISCUSSION

This study was designed to identify outcome complications of PEG insertion and their managements to evaluate the efficacy of PEG in improving patient's lifestyles. 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 failed cases one of them was 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. In contrast to a retrospective review conducted by **Vanis and colleagues** between January 2005 and October 2012, a total of 366 PEG operations were done, with 359 tubes successfully placed, resulting in success rates more than 95%. PEG insertion failed in 7 cases owing to anatomical abnormalities or malignant GI blockage ⁽⁵⁾.

Stroke with bulbar symptoms or malnutrition due to 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, **Vujasinovic and colleagues** concluded that stroke was the most common indication in group of patients (22.8%) ⁽⁶⁾. The most prevalent reasons for PEG tube insertion, according to **Anderloni and colleagues** in Italy, were dysphagia due to stroke in 33 %, neurological illness in 22.1 %, cancer in 17.8 %, and dementia in 14.3 % ⁽⁷⁾.

In research by **Ermis and colleagues**, they calculated the risk of problems after a year of long-term follow-up of patients who had a percutaneous endoscopic gastrostomy and found a (18%) prevalence of adverse events ⁽⁸⁾. When comparing these results to the current study, the problems reported were 16 patients (26.67%), with fourteen patients (23.3%) having minor difficulties and two patients (3.3%) having serious complications. The most common consequence following the insertion of PEG tubes was wound infection. Wound infection was found to be the most common infection (8.3%), followed by cellulitis (3.3%) This was consistent with prior research by **Vizhi and colleagues**, which found a high frequency of (21.9%), particularly in the acute postprocedural phase. Obesity, diabetes mellitus, hypoalbuminemia, and prolonged steroid medication were all recognized as risk factors for infection by the authors of this study as well as Prior radio-chemotherapy exposure before PEG implantation, low nutritional condition, length of hospital or ICU stay ⁽⁹⁾.

We proved that the patient comorbidities may affect PEG tube insertion site increasing risk of infection and its management especially diabetic patients. 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. Antibiotic prophylaxis is not indicated by the ESPEN artificial enteral nutrition recommendations, however in our hospital protocol, all patients who underwent PEG insertion received a single intravenous dose of ceftriaxone 2 g intravenously as a preventative measure on the day of the procedure ⁽¹⁰⁾.

It was unexpected to find 2 of patients with ileus complication post insertion (3.3%) on the contrary to study conducted by **Shangab and Shaikh**⁽¹⁰⁾ PEG tube installation does not necessarily increase the chance of developing ileus over time unless the patient already has chronic constipation owing to another cause, which is the case in that study.

One case of buried bumper syndrome (1.7%) and one case of significant hematemesis and melena were the only serious side effects reported in our research (1.7 %). This is consistent with the previously reported incidence of 0.3 to 2.4 % ⁽¹¹⁾.

During 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. In order to minimize ulcers at the gastrostomy site, excessive lateral traction on the tube should be avoided. Patients with upper gastrointestinal bleeding following the use of a PEG can tolerate endoscopy. Adjusting the PEG externally should make the mucosa under the internal bolster visible during endoscopy ⁽¹²⁾.

Lucendo and Frigal-Ruiz⁽²⁾ conducted research that found a risk of bleeding in individuals who had PEG tubes placed while on antiplatelet treatment, as well as a possible thromboembolic risk if these medicines were stopped. Antiplatelet treatment was shown to be safe in this systematic review, although more prospective and randomized studies with bigger sample sizes are needed to corroborate the findings.

Excessive tissue tension between the exterior and internal bumpers results in ischemia necrosis of the stomach wall, which in turn causes buried bumper syndrome, a dangerous complication that affects 0.3-2.4 % of patients. Patients with cancer, poor baseline nutritional condition (BMI 20), and who are receiving systemic corticosteroids or chemo-radiation are more likely to develop BBS ⁽¹³⁾.

Even though buried bumper syndrome was not initially recognized in our patients, internal bumper migration is extremely likely to have occurred one week after the procedure, given the rapid progression of the infection in the stoma as well as the formation of a new feeding chamber within the abdomen wall one week later. Using a guide wire and traction, as well as antibacterial treatment, the patient's PEG tube was successfully relocated, allowing PEG feeding and enough nutritional assistance to continue. The feasibility of placing PEG tubes under intravenous

anesthesia in older individuals with various comorbidities was validated by our findings. Minor problems are prevalent, and while serious consequences are uncommon, the prognosis for patients with many comorbidities is bleak. Patients who are candidates for PEG feeding should have a good prognosis because of the possible morbidity. It is not suited for those who have illnesses that are fast progressing and incurable.

CONCLUSION AND RECOMMENDATIONS

For patients who have had insufficient oral intake for more than 28 days and a functioning digestive system, we came to the conclusion that PEG was widely accepted as a safe method of providing enteral feeding.

When a patient suffers from a stroke that causes bulbar symptoms, PEG tube implantation is the best option if the patient's medical condition is not contraindicated. Although the pull approach is the most popular, different strategies are conceivable or even required in specific circumstances.

Knowing when and how to insert PEG tubes, as well as how to manage and even remove them, is an essential aspect of many patients' care. Infection is the most common problem associated with PEG tubes, and it can cause mild or significant issues.

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