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Our six years experiences about percutaneous endoscopic gastrostomy in surgical endoscopy unit

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ABSTRACT

Introduction: Percutaneous Endoscopic Gastrostomy (PEG) is the preferred method of nutrition for patients that are in need of long term enteral feeding. In this study, we aim to convey a six–year experience of a surgical endoscopy unit in the light of the literature.

Materials and Methods: Patients that underwent PEG in our clinic between the years 2015 and 2020 were included in this study. Demographic and clinical data, indications, early and late complications, and long term results of the patients were analyzed retrospectively. PEG was employed using the standard pull method.

Results: One hundred six patients participated in our study. The age average was 61, and the male sex was predominant (71%). The findings obtained in this study showed that 81.2% of the patients had comorbidities. Eight patients had an abdominal operation history. The most frequent indications were chronic neurological disease (36.8%), prolonged coma after head trauma (11.3%), and head and neck cancers (10.4%). The incidence of catheter–related early complications was observed to be 17.9%, and the most frequent complication was the leakage in the catheter insertion site. The incidence of general complications was observed as early complications (<30 days) (4.7%) and late complications (>30 days) (0.9%), respectively. Catheter dysfunction developed in eight patients during their follow–up examinations. Recurrent medical interventions were performed on five patients. The incidence of catheter–related unplanned arrivals at the hospital was 8.5%.

Conclusion: PEG is a safe, minimally invasive, effective, well–tolerated practice with a low incidence of complications and is used in the provision of nutritional support enterally. The most frequent complications are related to the care of the catheter insertion site. To reduce such complications, emphasis should be placed on training related to catheter care.

Keywords: Complication and Indication; percutaneous endoscopic gastrostomy; surgical endoscopy unit.

Introduction

Patients who fail to follow a normal oral diet, despite having normal gastrointestinal functions, should be fed enterally as far as possible in order to maintain gastrointestinal mucosal integrity, the functions of the intestinal mucosal barrier, the intestinal immune response, and the structure of normal flora.[1,2]

Gastric feeding is the most common type of enteral feeding. A gastrostomy tube can be placed by means of an endoscopy, radiological imaging, or surgical techniques.

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Although the surgical or radiological insertion of a percutaneous endoscopic gastrostomy (PEG) tube is possible, endoscopic insertion tube is preferred because it is less invasive and easier to perform.[3] The PEG procedure was first defined by Gaudere et al.[4] in 1980, and since its first performance, it has become a method frequently performed by general surgeons, gastroenterologists, and pediatric surgeons, and proven its reliability all over the world, including in Turkey.

The most frequent contemporary indications for PEG are neurological cases, cerebrovascular accidents, and malignancies of the oropharynx, larynx, and esophagus. Less common indications are the fortification of oral intake in patients with head trauma and gastric decompression.[6] A PEG can be performed safely thanks to increases in surgical experiences and technological advancements. Post–PEG complications are quite rare; the general incidence of complications following PEG tube placement varies from 4% to 24%. The most common and severe complications are gastric wall necrosis, colon perforation, bleeding, and peritonitis, while the most frequent minor complications are catheter blockage, leakages from the insertion site, and infections in the insertion site.[5,6]

In this study, we aim to present early (<30–day) and late (>30–day) follow–up results of a PEG procedure performed for enteral nutrition by the general surgery team at our hospital over a period of six years, as observed during subsequent examinations and in light of the literature.

Materials and Methods

The study included patients who have undergone percutaneous endoscopic gastrostomy in our clinic from 2015 to 2020. The patients' endoscopy records, electronic files, and nurses' observation charts were investigated, while the post–discharge details of the patients were obtained via polyclinic records and phone calls. A database was built up using data obtained from the patients or their relatives, and the patients' data obtained from this database were analyzed retrospectively. Patients who had incomplete medical records, had undergone a surgical gastrostomy, or who were under 18 were excluded from the study.

The data that were analyzed consisted of patients' demographic and clinical data, laboratory parameters, an abdominal surgical history, the presence of comorbidities, PEG indications, the presence of catheter–related 30–day complications or other long–term complications, catheter dysfunction during follow–up examinations, the presence of recurrent interventions, post–discharge catheter–related unplanned arrivals, the 30–day mortality rate after the procedure, and the necessity of the removal of the catheter in the long term.

The IBM SPSS Statistics for Windows, version 24 (IBM Corp., Armonk, N.Y., USA) package program was used for the statistical analysis of the data. Categorical measurements were summarized in terms of numbers and percentages, while continuous measurements were summarized as averages and standard deviations (minimum–maximum, where necessary).

Application Technique

Informed consent forms were obtained from patients and their relatives before the procedure. Enteral feeding was stopped in all patients at a minimum of 12 hours before the procedure, while the medication of patients on anticoagulant or antiaggregant drugs was discontinued one week before, with low molecular weight heparin being added to their treatment. Low–molecular–weight heparin was withdrawn eight hours before the operation. The procedures were performed on patients at their bedside, either in the endoscopy or the intensive care unit. In our clinic, the PEG procedure was performed using an 18–Fr percutaneous endoscopic gastrostomy set consisting of Flocare (Nutricia), Flexiflo (Abbott), and Kendall (Covidien), and made use of the pull method described by Gauder et al.[7] Prophylactic antibiotics were not administered to patients, who were also monitored before the procedure was initiated. The patients' pulse rate, blood pressure, respiration rate, and oxygen saturation were followed up throughout the procedure, while supplemental oxygen was given through a nasal cannula, with mouthpieces placed to keep their mouth open. Sedoanalgesia was applied to patients with 0.1 mg/kg midazolam (Dormicum, Roche), propofol, and fentanyl. If needed, help was obtained from the anesthesia clinic. Gastric decompression was performed via the 24–hour free drainage of the tubes of the patients who underwent PEG. Following the examination of the tube by the surgical team on the next morning, the patients were fed with a fiber–rich enteral product at a speed of 10 cc/h.

Results

The study looked at 106 patients in total. The average age was 61.56, and 71% were male. A total of 81.2% had comorbidities, while eight had a previous abdominal operation

history. Three of the patients had undergone abdominal surgery for an appendectomy (three, five, and ten years previously); two patients had undergone a total abdominal hysterectomy and salpingoooferectomy (three and ten years previously); one patient a cholecystectomy (three years previously); one a Graham–type repair due to a patient peptic ulcer perforation (four years previously); and one a lapatomy due to a patient–penetrating cutting–tool injury (12 years previously). The average albumin level was 2.71 gr/dl. The demographic and clinical features are detailed in Table 1.

The most frequent indications were chronic neurological disease (36.8%), head trauma (11.3%), and head and neck cancers (10.4%). The distribution of the cases by etiology is outlined in Table 2.

Table 1. Demographic and clinical features

Variable	n	%
Sex		
Male	67	71
Female	39	29
Age	61.56±16.5	18-100
Comorbidities		
No	20	18.8
Comorbidity	69	65
Multicomorbidity	17	16.2
Abdominal operation history	8	7.5
Hemoglobin (g/dL)	10.87±1.63	8-16
Albumin (g/dL)	2.71±0.42	1.9-3.6
White blood cell count mm3/L	8.16±2.1	0.5-13.2
Platelet count mm3/L	245.9±74.6	109-435
APTT (sn.)	31.6±4.8	20-45
PT (sn.)	12.6±1.7	9-23
INR	1.005±0.12	0.7-1.4

The most frequent catheter–related complication was a leakage in the catheter insertion site, which was observed in both the early (<30–day) and late (>30–day) periods, with a rate of incidence of 8.5% and 5.7%, respectively. A hemorrhage was the most frequent complication of early general complications (2.8%), while catheter dysfunction was observed in eight patients during their follow–up examinations. Five patients underwent recurrent interventions. The incidence of catheter–related unplanned arrivals at the hospital was 8.5%, but no patient–related mortality developed in 30 days. The complications and follow–up results are detailed in Table 3.

Discussion

A PEG is a common procedure performed on patients that need long–term enteral feeding and have normal gastrointestinal function. Although standard criteria designated for PEG endication are currently not available, guides published by the American Gastroenterological Association recommend performing a PEG only on patients who are expected to survive for more than 30 days after the procedure.[8,9]

In studies that look at a broad range of cases published both in Turkey and across the world, patients with neurological disorders are observed to make up the majority of patients who receive a PEG.[3,10] Demirci et al. reported that 77.1% of patients who received a PEG tube did so due to neurological disorders. Other indications are head–neck tumors, prolonged mechanical ventilation assistance, benign and malign diseases that cause upper gastorintestional obstructions, and a lack of adequate swallowing function.[3] Similarly, Özgüç et al.[11] found that 66.3% of all patients who underwent a PEG did so due to a chronic neurological disease.

Patients with malignancy comprise a significant proportion of patients who receive a PEG (15–44%).[11,12] In this patient group, feeding through a PEG tube was found to

Table 2. Distribution of cases by etiology

Malignancy	n	%	Chronic disease	n	%	Other indications	n	%
Head and neck cancer	11	10.4	Chronic neurological disease	39	36.8	Head Trauma	12	11.3
Brain tumor	9	8.5	Cerebrovascular event	5	4.7	Prolonged ventilation	9	8.5
Esophageal Cancer	7	6.6	Other chronic disease	3	2.8			
Lung Cancer	2	1.9						
Other cancers	9	8.5						

Table 3. Complications and follow-up results

Catheter-related complications	Early (<30 days)		Late (>30 days)	
	n	%	n	%
Leakage around the catheter	9	8.5	6	5.7
Infection around the catheter	6	5.7	1	0.9
Catheter blockage	2	1.9	0	
Catheter detachment	1	0.9	3	2.8
Catheter migration	1	0.9	2	1.9
Gastric outlet obstruction	0		1	0.9
General Complications				
Hemorrhage	3	2.8	0	
Aspiration pneumonia	2	1.9	0	
Perforation of the bowel	0		1	0.9
Catheter dysfunction			8	7.5
Recurrent Intervention			5	4.7
Chateter-related post-discharge unplanned arrival			9	8.5
Did the PEG need to be withdrawn?			3	2.8
Procedure-related 30-day mortality				0.0

be effective at reducing weight loss, subnutrition, and hospitalization length. It was also associated with better rates of general survival.[13,14] Various studies support prophylactic PEG tube placement to help patients to maintain body weight and strength, and to avoid the adverse results of undernutrition.[15]

In our series, one–third of the patients who underwent PEG had malignancy, and in line with the literature, head and neck cancers were the most frequent of these malignancies. In our clinic, we advocate pre–radiochemotherapy prophylactic PEG tube placement for patients with malignancies because we believe that patients with head and neck tumors are particularly likely to lose their ability to receive an endoscopic intervention when progression develops. We believe that PEG is the right choice, especially in cases of swallowing function loss for neurological patients with a long life expectancy. PEG tubes were placed in many patients due to prolonged intubation, and the performance of the PEG against the increased risk of pneumonia due to the nasogastric tube placed for feeding purposes was considered to be more suitable for these patients.

Although PEG is a minimally invasive, effective, and reliable procedure, some complications can occur, either during or after the procedure. These complications or its results can be especially frightening, when the comorbidities and indications of the application of PEG are taken into consideration. In the literature, the total incidence of complications relating to this intervention has been reported to be 8–42%.[6,9] Many studies that have evaluated post–PEG complications are designed as retrospective studies, and include a small and selected group of patients. These complications have been classified into a wide range of categories, many of which (8–42%) form part of this classification. In their study, Karaca et al.[6] reported the incidence of catheter–related complications to be 17%, while Demirci et al.[3] reported the incidence of major complications to be 3.2% and that of minor complications to be 15.9%.

In our investigation, we encountered a number of early catheter–related complications. Similarly to the literature, leakages around the catheter and infections in the catheter insertion site were the most frequent complications, the majority of which were restrained with local wound care and antibiotherapy. Aspiration pneumonia developed in two patients as a major complication, while catheter migration developed in one patient in the early period and in two patients in the late period, necessitating a surgical reintervention. Colon perforation due to transcolonic passage developed in one patient during the reinsertion of the catheter, following its removal due to catheter migration.

There are some controversial findings in the literature concerning prophylactic antibiotic administration before the procedure.[16] The ESPEN guideline states that antibiotic prophylaxis is not necessary for patients taking antibiotics and when the PEG procedure is performed by experienced staff, while they recommend the administration of antibiotic prophylaxis for suspected cases and when the procedure is performed by inexperienced individuals.[17] We did not administer routine antibiotic prophylaxis to our patients.

Notwithstanding the technique we employed, there could be failures in the performance of PEG due to obesity, anatomical variation, and previous gastrointestinal surgeries. The success ratio increases with experience, and in the literature, the success rate can reach 95%.[18] A laparotomy was previously accepted as a contraindication for PEG tube placement, but today, is not. In the literature, the incidence of failure after previous gastrointestinal surgery can reach 12%.[19] A unique difficulty for the endoscopist is a patient who has previously undergone gastric surgery. One report found that the PEG procedure failed in 28% of patients who had previously undergone a gastric resection,[20] and we observed catheter dysfunction in eight patients for a variety of reasons. Many patients who developed a catheter dysfunction coincided with the early period of our learning curve, and the incidence of previous abdominal surgery was also high in our series.

One of the most common reasons why patients with PEG tubes presented at our emergency department during follow–up examinations was as a result of tube–related complications. The tube can move in and out of the stomach, while if the tube penetrates the interior of the stomach into the pylorus, this will lead to lumen obstruction, and if it protrudes from the stomach wall, it can spring from the suture area. In the literature, the incidence of such complications tends to be in the range of 7.3–12.8%.[21,22] In our series, 8.5% of patients needed to return to the hospital due to post–discharge catheter–related problems, but the problem was solved in many patients, without a need for hospitalization. The best way to prevent catheter–related problems from developing over the long term is via good home care ensured by training patient companions.

Although PEG placement is safe, patients undergoing this procedure do have a certain risk of mortality. In the literature, post–PEG mortality varies between 10–15%.[12,18,23] Almost all of the reported causes of mortality are related to the primary disease of the patient; PEG–associated mortality is close to zero in all studies, while procedure–related mortality is reported as being 0.5–2%.[12,24] Previous research has defined certain factors associated with post–PEG mortality. Arora et al.[18] found PEG indications to be closely correlated to mortality. In their study, mortality increased with age, congestive heart failure, renal failure, chronic pulmonary disease, coagulopathy, disorders of the pulmonary circulation, metastatic cancer, and hepatopathy. In our study, no patient–related mortality was seen in 30 days.

The most significant limitation of our study is its retrospective nature, along with its failure to clearly evaluate the feeding parameters of the patients.

Conclusion

PEG procedure has been evaluated to be a safe, practical, effective, and well–tolerated procedure, with a low incidence of major complications.

Disclosures

Ethichs Committee Approval: The study was analyzed retrospectively in accordance with the ethical rules based on the principles of the Helsinki Declaration between 2015 and 2017.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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

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