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Percutaneous Endoscopic Gastrostomy: Single–Center Experience

Perkutan Endoskopik Gastrostomi: Tek Merkezli Çalışma

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Abstract

Aim: Percutaneous endoscopic gastrostomy (PEG) is a common method for patients who cannot be oral-fed. This study aims to evaluate the demographic characteristics, indication of PEG and early (<30 days) and late (30> days) complications of PEG patients performed in our hospital over four years.

Material and Method: The study is a retrospective study. This study includes patients who underwent percutaneous endoscopy gastrostomy between 2016-2020 in the endoscopy unit and intensive care units in the general surgery clinic of our hospital. The age, gender, comorbidities, length of hospital stay, PEG indications, the day of hospitalization, the complications, if any, and the day the complications developed were recorded on the computer. Complications before 30 days were divided into groups as early complications and those developing after 30 days of late complications.

Results: A total of 207 patients the PEG procedure. When PEG indications were examined, it was observed that the most common cause was cerebrovascular events with a rate of 44.93%. Complications were observed in 19 (9.18%) of the patients after the procedure. 68.42% (13) of complications were seen before 30 days. In the evaluation, which was grouped as non-complicated and complicated patients, no significant difference was observed between age, gender, systemic diseases, time to PEG procedure, endoscopic or surgical opening, and mortality rates.

Conclusion: Although PEG is a more invasive method compared to other methods in terms of enteral nutrition, it is the most preferred feeding method due to its low complication rate, fast and easy application, and low cost. PEG is recommended for eligible patients who are scheduled for long-term enteral nutrition.

Keywords: Percutaneous endoscopic gastrostomy, nutrition, indication, complications

Öz

Amaç: Perkutan endoskopik gastrostomi (PEG) oral yolla beslenemeyen hastalarda sık kullanılan bir yöntemdir. Bu çalışmada hastanemizde yapılan ve dört senelik periyot içinde PEG uygulanmış hastaların demografik özellikleri, PEG endiskasyonları ve PEG'e bağlı erken (<30 gün) ve geç (30> gün) komplikasyonların değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışma retrospektif bir çalışmadır. Bu çalışma hastanemiz genel cerrahi kliniği tarafından endoskopi ünitesinde ve yoğun bakım servislerinde 2016-2020 yılları arasında peruktan endoskopi gastrostomi yapılan hastaları kapsamaktadır. Hastaların yaş, cinsiyet, ek hastalıkları, hastanede kalış süreleri, PEG endikasyonları, yatışının kaçıncı günü PEG takıldığı, varsa komplikasyonları ve komplikasyonların kaçıncı gün geliştiği bilgisayar üzerinden kayıt altına alındı. Komplikasyonlar 30 günden önce olanlar erken komplikasyon, 30 günden sonra gelişenler ise geç komplikasyon olarak gruplara ayrıldı.

Bulgular: Toplam 207 hastaya PEG işlemi uygulanmıştır. PEG endikasyonları incelendiğinde en sık sebebin %44,93 ile serebrovasküler olaylar olduğu izlenmiştir. Hastaların 19'unda (%9,18) işlem sonrasında komplikasyon gözlenmiştir. Komplikasyonların %68,42'si (13) 30 günden önce görülmüştür. Hastalar non-komplike ve komplike hastalar olarak gruplandırılmış yapılan değerlendirmede yaş, cinsiyet, sistemik hastalıklar, PEG açılıncaya kadar geçen süre, endoskopik ya da cerrahi açılması ve mortalite oranları arasında anlamlı farklılık gözlemlenmemiştir.

Sonuç: PEG enteral beslenme açısından diğer yöntemlere göre daha invaziv bir yöntem olmasına rağmen düşük komplikasyon oranı, hızlı ve kolay uygulanması, fazla maliyeti olmaması nedenli en sık tercih edilen beslenme methodudur. Uzun dönem enteral beslenme planlanan uygun hastalara PEG uygulanması önerilmektedir.

Anahtar Kelimeler: Perkütan endoskopik gastrostomi, beslenme, endikasyon, komplikasyonlar

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INTRODUCTION

Percutaneous endoscopic gastrostomy (PEG) is an appropriate form of enteral nutrition for patients who cannot be fed orally but have a normal functional gastrointestinal tract. Other forms of enteral feeding are nasogastric, nasojejunal, and feding jejunostomy. Among these, nasogastric and nasojejunal interventions are easier, but there are more uncomfortable and easy dislocation and obstruction problems for the patient. Percutaneous gastrostomy is more effective in long-term feedings, but because it is an invasive procedure, the risk of complications is higher.[1]

The gastrostomy feeding method is the most widely used enteral feeding method. The enteral tube can be placed in three different ways. A gastrostomy tube can be placed using an endoscopy, radiological imaging, or surgical techniques.[2] Despite the surgical and radiological placement of an enteral feeding tube, it is the easiest and least invasive endoscopic method.[3] The PEG procedure was first defined by Gaudere et al. in 1980.[4]

The most common indications for PEG are neurological diseases, cerebrovascular diseases, and laryngeal and esophageal malignancies. Apart from this, PEG can be applied to patients whose oral intake is impaired due to head and neck trauma.[5] Although PEG is a safe and easy-to-apply method, complications can be observed rarely. Complications such as wound infection, peristomal leak, pneumoperitoneum aspiration, bleeding, obstruction of the feeding tube, gastric outlet stenosis, and peritonitis can be seen after the feeding tube is placed in the stomach with PEG.[6]

PEG is a safe and frequently used method in patients who cannot be fed orally. This study, it was aimed to evaluate the demographic characteristics, PEG indications, and early (<30 days) and late (30> days) complications related to PEG in patients who underwent PEG in our hospital over four year period. We think that the PEG application will contribute to the literature in terms of which patients to apply to and to evaluate early and late complications.

MATERIAL AND METHOD

This study includes patients who underwent percutaneous endoscopy gastrostomy between 2016-2020 in the endoscopy unit and intensive care units by the general surgery clinic of our hospital. Medical and endoscopic records of the patients were reviewed retrospectively through the hospital computer system. Patients older than 18 years of age, who had not undergone previous gastric surgery, had a functional gastrointestinal system but did not have oral intake, and whose data were available, were included in the study. Patients under the age of 18 whose stomachs could not be accessed endoscopically and whose data could not be accessed via the hospital computer system were excluded from the study. The age, gender, comorbidities, length of hospital stay, PEG indications, the day of hospitalization, the complications, if any, and the day the complications developed were recorded on the computer. Complications before 30 days were divided into groups as early complications and those developing after 30 days as late complications. In addition, the values of White blood cell (WBC), lymphocyte (lym), neutrophil (Neu), neutrophil/lymphocyte ratio (NLR), C-reactive protein (CRP) and albumin before endoscopy were recorded via computer records. The relationship between these hematological values and complications was statistically analyzed.

The endoscopy procedure was performed in the endoscopy unit for the patients who could come to the endoscopy unit, and as a bedside for the patients who could not come to the endoscopy unit and be intubated in the intensive care unit. All patients and their relatives were informed before the procedure. Before the procedure, all patients underwent routine laboratory examinations and anesthesia consultations. All patients were under anesthesia. All procedures were performed by general surgeons. Enteral nutrition was stopped at least 8 hours before the procedure. Before the endoscopy procedure, all patients were sedated with propofol and/or midazolam.

All endoscopic procedures were performed with Fujinon brand video gastroscopy devices. 20-24 Fr PEG sets were used in all procedures. Before the procedure, the duodenum was advanced to the second continent and the whole stomach was evaluated. Surgical gastrostomy was planned for patients who were not suitable for PEG due to gastric pathology and incision due to previous operations. Patients who were suitable for PEG were transilluminated with a gastroscope after skin sterilization was completed. The peg tube was advanced with the pull technique. The PEG tube was inserted by removing it from the skin. Enteral nutrition was planned to start 12 hours after the PEG procedure.

The data for the study were scanned retrospectively from the Hospital Information Management System. Ethics committee approval for the study was received from Bursa Yüksek İhtisas Training and Research Hospital Clinical Research Ethics Committee in 2020 (Decision No: 2011-KAEK-25 2020/08-04). The study was carried out in accordance with the Helsinki Declaration.

Statistical Analysis

This study was planned retrospectively. All statistical analyzes were performed using IBM SPSS Statistics for Windows software (version 26; IBM Corp., Armonk, N.Y., USA). Descriptive statistics; For categorical variables, number and percentage, age, length of hospital stay, time until PEG procedure, day of complication and follow-up time were used as median and minimum and maximum values in parentheses, and laboratory values as mean ± standard deviation and median in parentheses. reported. The normal distribution of data was evaluated with the Shapiro Wilks test. Relationships between variables were investigated with Pearson or Spearman correlation coefficient in by the with the data distribution.

Comparing the numerical measurements for two independent groups according to the research groups, age, length of hospitalization, time to PEG opening, day of complication, and laboratory values were evaluated with Mann Whitney U test in accordance with the data distribution. The categorical variables such as gender, stoma opening type, number of systemic diseases and mortality rates were compared according to the research groups by using Chi-square and Fisher exact tests. For statistical significance level, $p<0.05$ was accepted.

RESULTS

Between 2016 and 2020, a total of 207 patients underwent the PEG procedure. Of the patients, 128 (61.84%) were male and 79 (38.16%) were female. The median age was 71 years, with the youngest patient being 19 and the oldest being 90 years old. When the known diseases of the patients before hospitalization were examined, 54.59% of them were cardiovascular, 19.81% were metabolic, 27.54% were neurological, 9.66% were respiratory system diseases, and 1.93% were pre-oncological diseases reported to have a history. While 42 of the patients (20.29%) had no previously known additional disease, 108 patients (52.17%) had only one system-related disease, and the number of patients with 2 or more system-related diseases was 57 (27.54%). determined.

The median length of stay of patients with PEG was 72 days, the shortest hospitalization was 13 and the longest was 364 days. The median time until PEG was opened was 28 days, the earliest was opened on the first day of hospitalization, and the latest was opened on the 296th day of hospitalization. Endoscopic gastrostomy was opened in 203 (98.07%) patients, and surgery was preferred in only 4 (1.93%) patients.

The patients were followed for a median of 72 days, the longest follow-up was 1095 days, and the shortest follow-up was 3 days. When the indications for PEG were examined, the most common cause was cerebrovascular events with 44.93%, followed by aspiration pneumonia with 24.15%, hypoxic encephalopathy with 13.53%, difficulty in oral intake with 10.14%, trauma with 4.83%, and 2% with, 42 and intracranial tumors were observed. Complications were observed after the procedure in 19 (9.18%) of the patients, and the complication types and rates are shown in **Table 1**. The median day of occurrence of complications was found to be 23, the earliest complication was observed on day 1, and the latest complication was observed on day 965. 68.42% (13) of complications were seen before 30 days. PEG-induced mortality was not observed in the whole group, and the mortality rate of the whole group was 38.16% (79).

The patients were divided into two groups non-complicated and complicated patients, and statistically significant differences were sought between all variables. No significant difference was observed between patients' age, gender, systemic diseases, time to PEG procedure, endoscopic or surgical opening, and mortality rates (see **Table 1** for p values). When the hospitalization and follow-up times were compared, both the median length of stay and the median follow-up time of the complicated group was found to be 93 days and were found to be statistically significantly higher than the median 70 days of the non-complicated group ($p=0.019$, $p=0.020$, respectively).

DISCUSSION

PEG is an effective method for feeding patients whose oral intake is inadequate for various reasons, but who have a functional gastrointestinal tract. The most effective examination in the investigation of upper gastrointestinal symptoms is gastroscopy.[7] Although gastroscopy is a diagnostic method, it is also used for PEG insertion in the treatment of patients with impaired oral intake. PEG is used as a method with low complication risk, inexpensive,and high efficiency in terms of providing long-term nutrition.[8] The most commonly used enteral feeding method is wig gastrostomy. Although PEG has many placement techniques, the pull technique is the most commonly used.[9] Enteral nutrition has been one of the most frequently used routes of nutrition in patients with cerebrovascular disease, other organic neurological diseases, and patients who cannot take oral food due to cancers in the head and neck region.[10] Although complications such as wound infection, leakage from the tube edge,and bleeding can be seen due to PEG, they are very rare.[11]

Considering the publications in the world and Turkey, it was observed that the most common indication for PEG was neurological diseases.[12] Şenlikçi et al.[13] followed the indication as neurological diseases in 92,3% of the patients who had PEG implantation. In the literature, Nicholson et al.[14] in their series of 168 cases, 73% of the patients had neurological pathology and most of them were patients with nutritional problems who had cerebrovascular attacks. In our study, the most common indication for PEG was cerebrovascular diseases with a rate of 44.93%. The lower rate compared to the literature was attributed to the fact that more subgroups were made in the indication discrimination. Hypoxic ischemic encephalopathy, intracranial tumors and trauma-related cerebrovascular events were considered as separate indications. When all of these indications are combined, results close to the literature are seen with a rate of 65%.

Although PEG is a minimally invasive and easy procedure, there is a risk of complications like any invasive procedure. Although minor complications that do not usually cause mortality can be seen, serious complications such as esophageal perforation, post-feeding leak-related peritonitis and gastrocolic fistula have also been reported.[14] According to the literature, process-related mortality rates range from 1-3%, major complication rates 6%, and minor complication rates from 12-15%.[15] Lin et al.[16], the rate of minor complications was 10.7%, and the rate of major complications

was 0.97%. In our study, complications were observed in a total of 19 patients, and a rate of 9.18% was consistent with the literature. In our study, 38.16% mortality was detected, but none of them were associated with the PEG procedure. The most common complications related to PEG are PEG leakage, wound infection,and bleeding. In the study concluded by Tekin et al.[1], wound infection was observed at a rate of 15%. Cakir et al.[17], wound site infection was observed in 7.1%. In our study, wound site infection was observed in 26.32% of patients with complications,and postoperative bleeding was observed in 15.79%. In our study, complications before 30 days were classified as early complications, and complications after 30 days were classified as late complications. The median day of occurrence of complications in our study was 23. Complications before 30 days were observed in 26.91% of all patients, and this was reported as an early complication. Sözüer et al.[2], 22.6% of complications were observed in the early period. In the study conducted by Çetin et al.[8], early complications were observed in 13.8% of the patients and late complications were observed in 6.4%. In our study, similar results were found in the literature.

The most important limitation of our study is that it is a retrospective study. The nutrition parameters of the patients could not be evaluated clearly due to retrospective nature. However, when we look at other studies, the high number of patients and the fact that it is performed by a single surgical clinic with specialist doctors distinguish the study from other studies.

Table 1: All patients data and comparison between two groups

Variables		All Patients (n=207)	Non-complicated (n=188)	Complicated (n=19)	Statistical Significance
Age		71 (19-95)	70.5 (20-95)	71 (19-90)	0.363
Gender	Male	128 (61.84%)	117 (62.2%)	11 (57.9%)	0.711
	Female	79 (38.16%)	71 (37.8%)	8 (42.1%)	
Cardiovascular Diseases		113 (54.59%)			
Metabolic Diseases		41 (19.81%)			
Neurologic Diseases		57 (27.54%)			
Respiratory Diseases		20 (9.66%)			
Oncologic Diseases		4 (1.93%)			
Multiple Systemic Diseases	None	42 (20.29%)	40 (21.3%)	2 (10.5%)	0.501
	1	108 (52.17%)	96 (51.1%)	12 (63.2%)	
	2	44 (21.26%)	41 (21.8%)	3 (15.8%)	
	3	13 (6.28%)	11 (5.9%)	2 (10.5%)	
Hospitalization Duration (Days)		72 (13-364)	70 (13-364)	96 (33-316)	0.019
Days Until PEG Procedure		28 (1-296)	28 (1-296)	33 (14-85)	0.328
Stoma Type	Endoscopic	203 (98.07%)	185 (98.4%)	18 (94.7%)	0.322
	Surgical	4 (1.93%)	3 (1.6%)	1 (5.3%)	
Indication	Aspiration Pneumonia	50 (24.15%)			
	Hypoxic Encephalopathy	28 (13.53%)			
	Intracranial Tumour	5 (2.42%)			
	Oral Intake Deficiency	21 (10.14%)			
	Cerebrovascular Incident	93 (44.93%)			
	Trauma	10 (4.83%)			
WBC		10.91±.4.56 (10.25)	10.82±4.53 (10.16)	11.74±4.87 (11.18)	0.472
LYM		1.78±1.41 (1.53)	1.78±1.45 (1.5)	1.78±0.87 (1.85)	0.351
NEU		7.93±4.19 (7.3)	7.85±4.15 (7.29)	8.71±4.63 (7.8)	0.515
CRP		76.3±61.66 (64.9)	75.31±60.89 (61.5)	86.09±69.91 (74)	0.390
ALB		2.54±0.58 (2.5)	2.54±0.59 (2.5)	2.57±0.57 (2.5)	0.853
NLR		6.25±5.91 (4.7)	6.09±5.4 (4.73)	7.82±9.69 (4.23)	0.850
Complication		19 (9.18%)			
Complication Type	Infection	5 (26.32%)			
	Hemorrage	3 (15.79%)			
	Deformity	4 (21.05%)			
	Leakage	2 (10.53%)			
	Obstruction	5 (26.32%)			
Day of Complication		23 (1-965)			
Complicated before 30 days		13 (68.42%)			
Follow Up Duration		72 (3-1095)	70 (3-1095)	96 (10-316)	0.020
Mortality		79 (38.16%)	71 (37.8%)	8 (42.1%)	0.711

PEG:Percutaneous endoscopic gastrostomy,WBC:white blood cell,LYM: lymphocyte, NEU: neutrophil, CRP: C-reactive protein, ALB: albumin, NLR: neutrophil/ lymphocyte rate

CONCLUSION

Although PEG is a more invasive method compared to other methods in terms of enteral nutrition, it is the most preferred feeding method due to its low complication rate, fast and easy application, and low cost. Fewer complications were observed in our study. It is thought that the improvement of expert teams and technical facilities caused this result. PEG is recommended for eligible patients who are scheduled for long-term enteral nutrition.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethics committee approval for the study was received from Bursa Yüksek İhtisas Training and Research Hospital Clinical Research Ethics Committee in 2020 (Decision No: 2011-KAEK-25 2020/08-04).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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