

Original study

Do we know all about percutaneous endoscopic gastrostomy?

Perkütan endoskopik gastrostomi hakkında her şeyi biliyor muyuz?

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ABSTRACT

Percutaneous endoscopic gastrostomy (PEG) is a safe, easy-to-apply, frequently used and effective method for patients requiring long-term enteral nutrition. In recent years, it has become questionable in terms of its indications in the current literature due to the complication and mortality rates seen after the procedure. In our study, it was aimed to evaluate the morbidity and indications of the procedure by examining the PEG applications performed in our center.

Patients who underwent PEG in our center between 2016 and 2020 were included in the study. All PEG procedures were performed by a single physician. The patients were analyzed in terms of demographic data, complications, American Society of Anesthesiologists (ASA) classification, survival, and underlying disease. The relationship between underlying disease, ASA score, age, sex and survey was evaluated. Underlying diseases were classified in 4 groups as dementia and other neurological diseases, head and neck malignancies, cerebrovascular disease, intensive care patients. Patients included in the group during the follow-up period were classified into 2 groups as ex and survivors. Chi-square test was used to compare sex, underlying disease and ASA score. Age factor was compared by student t test. (yapılan istatistik analiz veya karşılaştırma yapılan gruplar??) (yapıldı)

In the statistical studies conducted; it was observed that the survival time was significantly longer in the age range of 70 years and older. Apart from this, no statistically significant result was found between the underlying disease and ASA score, and life span and mortality.

We think that consensus is needed in terms of the surveillance expectation and procedure indications stated in guidelines for the right patient selection under the light of literature discussions.

Keywords: Percutaneous endoscopic gastrostomy; enteral nutrition; gastrostomy

ÖZET

Perkütan endoskopik gastrostomi (PEG), uzun süreli enteral beslenme gerektiren hastalarda güvenli, uygulaması kolay, sık kullanılan ve etkili bir yöntemdir. Son yıllarda işlem sonrası görülen komplikasyon ve mortalite oranları nedeniyle güncel literatürde, endikasyonları açısından sorgulanır hale gelmiştir. Çalışmamızda merkezimizde yapılan PEG uygulamaları incelenerek işlemin morbidite ve endikasyonlarının değerlendirilmesi amaçlanmıştır.

2016-2020 yılları arasında merkezimizde PEG yapılan hastalar çalışmaya dahil edildi. Tüm PEG işlemleri tek bir hekim tarafından yapıldı. Hastalar demografik veriler, komplikasyonlar, American Society of Anesthesiologists (ASA) sınıflaması, sağkalım ve altta yatan hastalık açısından analiz edildi.

Yapılan istatistiksel çalışmalarda; 70 yaş ve üzeri yaş aralığında yaşam süresinin anlamlı olarak daha uzun olduğu gözlemlendi. Bunun dışında altta yatan hastalık ile ASA skoru, yaşam süresi ve mortalite arasında istatistiksel olarak anlamlı bir sonuç bulunamadı.

Literatür tartışmaları ışığında doğru hasta seçimi için kılavuzlarda belirtilen sağkalım beklentisi ve işlem endikasyonları açısından fikir birliğine ihtiyaç olduğunu düşünmekteyiz.

Anahtar kelimeler: Perkütan endoskopik gastrostomi; enteral beslenme; gastrostomi.

INTRODUCTION

Percutaneous endoscopic gastrostomy (PEG) has become the most commonly used procedure for enteral nutrition since it had been introduced in 1980 by Gaudere and Ponsky (1), because it is a safe and practical technique (2,3). Generally, PEG insertion is the accepted as an indication if the patients could not be fed orally for more than 2-3 weeks. PEG may be inserted in three different ways: 1- Pull method (1); 2- Push method (4) 3- pushed over dilator method (5). In practice, the most commonly used method is the pull method.

There are different definitions for the major and minor complications of the procedure, and the complication rates were reported in the literature in a wide margin of 8-42.9% (2-4,6,7). Major complications include bleeding, organ injury, wound infection, buried bumper syndrome, tube obstruction, peristomal leakage, tube removal, gastric ulcer, aspiration pneumonia, pneumoperitonium.

The technique and complications of the PEG procedure have been defined, however, especially in recent years, there are publications discussing the indications of the procedure. In clinic, it is most commonly used for neurological diseases (2,8). However, the authors discuss the indications of the PEG procedure especially in dementia patients, and draw attention to unnecessary practices (2,4,9-12).

The aim of this study was to evaluate the morbidity and indication of PEG procedure retrospectively by investigating PEG applications performed by a single center and a single physician.

MATERIAL and METHOD

Between 2016 and 2020, 72 patients who underwent PEG by a single physician in a single center were included in the study. Patients were assessed in terms of demographic data, procedural complications, American Society of Anesthesiologists (ASA) classification, survival, and underlying disease.

PEG procedure was performed in operating room conditions under sedoanalgesia. Following gastroscopic examination, translumination was observed in the abdominal wall, finger palpation was performed, local anesthesia was applied, continuous aspiration was performed by a peg cannula in the injector to enter the stomach, and the PEG catheter was inserted by pulling method. The same commercial kit was used in all patients. A single dose of antibiotic prophylaxis with 1st generation cephalosporin was administered to all patients within 30 minutes before the procedure. After postoperative 8-12 hours, enteral nutrition was initiated with 20 cc saline solution. The patient was followed up for 1 hour for the signs of vomiting, abdominal pain and abdominal swelling to see whether the patient tolerated

the nutrition or not. After the patient tolerated the nutrition, 20 cc of nutritional solution and then 20 cc of water were administered. The amount of nutritional solution and water were increased by 10-20 cc every 4 hours. The same findings were observed to evaluate tolerability. Intermittent nutrition was aimed by giving 125 cc food and 100 cc water every hour. Daily catheter dressing was applied for the first week.

The relationship between underlying disease, ASA score, age, sex and survey was evaluated. Underlying diseases were classified in 4 groups as dementia and other neurological diseases, head and neck malignancies, cerebrovascular disease, intensive care patients.

The patients in the study were followed up. Patients included in the group during the follow-up period were classified into 2 groups as ex and survivors. The excitus group was compared with the survival group statistically by age, sex, underlying disease and ASA score.

Statistical analysis was performed by SPSS 21.0 statistics program. Chi-square test was used to compare sex, underlying disease and ASA score. Age factor was compared by student t test. The patients were classified in 4 groups by age as ≤ 60 /years, $>60 \leq 70$ /years, $>70 \leq 80$ /years, >80 /years. The effect of age range on mortality was compared statistically by the chi-square test.

The effect of underlying disease, and ASA score on survival was assessed by the Kaplan-Meier test. Parameters with a statistical difference of $p < 0.05$ were considered significant.

RESULTS

Average age of the study group was 75.2 years and among 72 patients in the study, 30 (41.5%) were male and 42 (52.5%) were female. During the follow-up period, PEG procedure was performed total of 77 times, twice in 5 patients. PEG procedure was successfully applied in all patients. No mortality was observed in any patients due to the operation.

In terms of underlying diseases: PEG procedure was performed in 17 (23.6%) patients due to cerebrovascular disease, 30 (41.6%) patients due to other neurological diseases (Dementia (24), Parkinson (2), motor neuron disease (3), cerebral palsy (1)), 19 (26.3%) patients due to head and neck malignancies (oral cancers, laryngeal cancer, esophageal cancer), and 6 (8.3%) patients who were intubated for respiratory support in the intensive care unit.

By ASA classification, 17 (23.6%) patients were classified as ASA 2, 32 (44.4%) as ASA 3, and 23 (31.9%) as ASA 4.

PEG tubes were removed in 8 (11.1%) patients; 5 of them had undergone PEG procedure in

our center and 3 patients had their first operation in another center. PEG procedure was repeated in 7 patients. Laparotomy and surgical gastrostomy were performed in one patient because PEG had removed on the first postoperative day.

In 3 (4.1%) patients with previous PEG insertion in another center, PEG procedure was repeated into the same tract because the previous PEG tube was removed due to the deformation and dysfunction of the PEG tube.

Bleeding occurred from the edge of PEG catheter in 1 (1.3%) patient. The bleeding stopped by conservative follow-up.

Wound infection developed in 3 (4.1%) patients during follow-up. The infection was treated with antibiotherapy and dressings.

PEG tube was obstructed in 2 (2.7%) patients. Buried Bumper syndrome developed in 2 (2.7%) patients.

The patients were followed up for approximately 11.6 (0-48) months. 42 (58.3%) patients died during follow-up, 35 of them (48.6%) died in the first year. When the time of death following PEG procedure was assessed: 10 (23.8%) patients died between 0-1 months, 6 (14.2%) patients died between 1-2 months, 8 (19%) patients died between 2-3 months, 6 (14.2%) patients died between 3-6 months, 5 (11.9%) patients died between 6 -12 months, 3 (7.1%) patients died between 12-24 months, 4 patients died between 24-36 months (9.5%) (Table 1).

Mortality time	SVH (n=17)	Dementia and other neurological diseases. (n=30)	ICU patients (n=6)	Head neck malignancies (n=19)	Total ex n=42, (%)
0-1. month	2	2	2	4	10(23,8)
1-2. month	2	2	1	1	6(14,2)
2-3. month	1	4	1	2	8(19)
3-6. month	2	1	0	3	6(14,2)
6-12. month	1	2	1	1	5(11,9)
12-24. month	1	1	0	1	3(7,1)
24-36. month	0	3	0	1	4(9,5)
	9(52,9%)	15(50%)	5(83,3%)	13(68,4%)	

The statistical studies showed that the survival was significantly longer in the age range of 70 years and older. Besides, no statistically significant result was found between the underlying disease and ASA score, and survival and mortality. The life expectancy after PEG procedure in patients over 70 years of age was significantly longer as compared to the patients under 70 years old ($p < 0.001$). When the age groups were assessed, among 50 patients over 70 years of age, 40 had undergone PEG procedure due to neurological diseases, and among 22 patients under 70 years of age, 16 due to intensive care or head and neck malignancies. Therefore, the patients were divided into two groups: one group for all neurological diseases and one group for head and neck tumors and intensive care patients. However, no statistically significant survival difference was found between these two groups. Kaplan-Meier survival test did not find any effects of ASA score and diagnosis on survival (Figure 1).

DISCUSSION

It is well-known that enteral nutrition has many benefits over parenteral nutrition. PEG is the most common method used in patients who require

medium and long-term enteral nutrition. PEG insertion is generally accepted if enteral nutrition is planned for more than 2-3 weeks (2). In this patient group with swallowing problems, the underlying diseases are most commonly neurological diseases (about 50%) and the second most common are head and neck malignancies (about 30%), however, rarely, it is used for intestinal decompression, due to cachexia and postprandial pain in chronic pancreatitis patients, due to pulmonary cachexia in chronic obstructive lung patients, due to the nutrition deficit in malignancy out of the gastrointestinal system, and in severe esophagitis (2,8).

The literature publications have classified PEG complications as major minor, acute or chronic and different complication rates have been reported. Because the complications are defined and evaluated differently (2). The most common complication in this study was removal of the PEG tube in 8 (11%) patients. Since tube was removed in the early period when fistula tract was not yet formed in one patient, PEG was repeated in the other 7 patients who had undergone surgical gastrostomy with laparotomy.

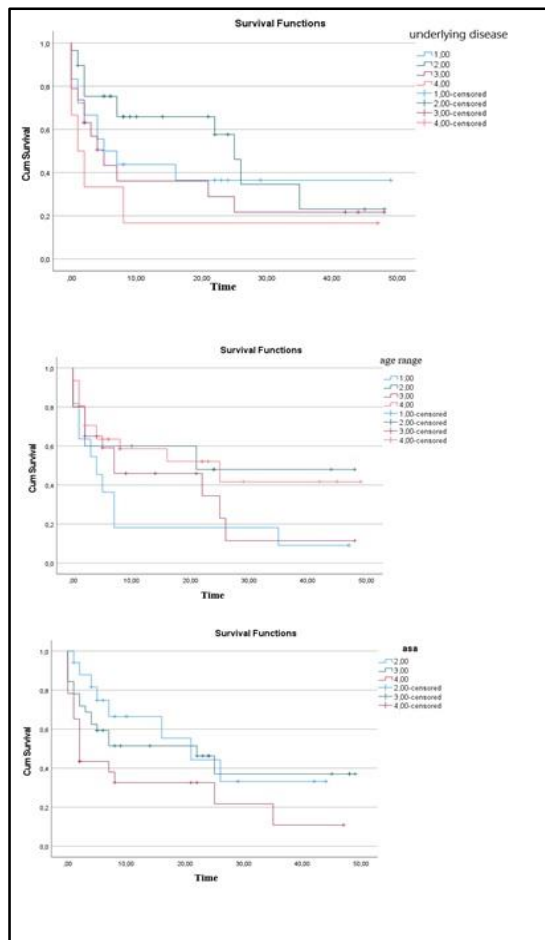


Figure 1

Catheter infection was suggested as the most common complication with an incidence of 5-25% in several studies (2,3). It may usually be treated with easy to use dressings and antibiotherapy, but rarely severe infections such as necrotizing fasciitis may occur. In the patients undergoing PEG procedure, the comorbidities as well as tightly PEG insertion causing external bolster pressure on the skin increase the wound infection (13). In this series, 3 (4.1%) patients had wound infection and were treated with easy to use dressing and antibiotherapy. As compared to the literature, lower infection rate was generally suggested as the insertion of the external bolster at a distance of 5-6 mm to the skin, as well as the professional nursing care during the longer surveillance of neurological patients as compared to other patient groups.

Buried Bumper syndrome was another rare but important complication suggested to be caused by the pressure due to the tight insertion of the internal and external fixators of the gastrostomy tube (14). High tissue pressure caused by fixators induces inflammatory processes including ischemia, necrosis, and infection, and is caused by the displacement of the internal bolster into the fistula tract in time. Apart from the clinical local findings, the inability to move back-forward and rotate the peg tube raises

suspicion. Patients may have symptoms such as abdominal pain, wound infection, abscess, peritonitis, and bleeding. There are different treatment methods such as pushing the gastrostomy tube back into the stomach, removing the tube and inserting another tube or removing completely (14,15). Buried Bumper syndrome was seen in two patients in this series. In one patient, the internal bolster was observed under the skin, and the tube was removed, and the PEG procedure was performed using the same tract. The other patient had hyperemia, induration and tenderness around the catheter. CT examination showed that the internal bolster was inside the anterior abdominal wall with a collection around it (Figure 2). The PEG tube was removed with a skin incision and abscess drainage was performed. A nasogastric tube (Ng) was inserted into the patient. The lesion healed in two weeks with NG nutrition, antibiotherapy and wound care, and PEG was applied from a different area.

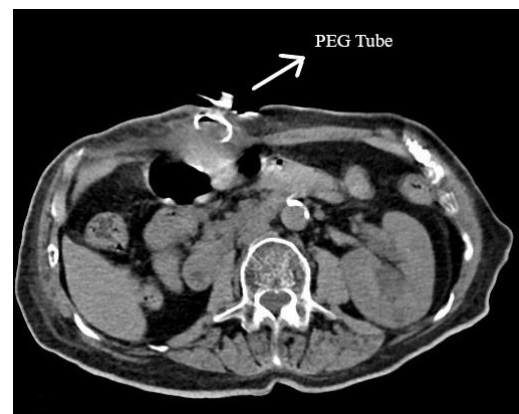


Figure 2

Obstruction was identified in the gastrostomy tube in two patients. In these patients, the PEG tube was shortened, then the residues accumulated in the tube were removed by milking, then the passage was cleaned by administrating pressurized water into the tube. Pressurized hot water in the tube is another recommended method to solve this problem (16). Cleaning the PEG tube with flash water after nutrition is a precaution preventing tube obstruction.

Another important point in the study was that gastrostomy was performed twice in 13 (18%) patients due to tube removal, tube deformation and buried Bumper syndrome. If this condition is considered as a complication, the most common complication in the study would be the need for repeated gastrostomy. In a retrospective study consisting of 164 patients, 59 (36%) had experienced PEG dislodgement during the follow-up period and this condition was suggested as the most common complication (17).

Pneumoperitoneum is a condition in a rate of up to 50% after PEG procedure. Mostly, no treatment is required and it may be tolerated by patients. Gyu Young Pih et al. (3) performed PEG procedure

on 401 patients, then assessed them by radiography. Pneumoperitonium was found in 38 patients (9.5%). Thirty of 38 patients were asymptomatic, while eight patients had signs of peritoneal irritation. However, success was achieved with conservative treatment without any interventions. In our study, the patients were not routinely examined for pneumoperitoneum, and no clinical finding suggesting pneumoperitoneum was identified in none of the patients.

American gastroenterology association (AGA) recommended PEG for the candidates, with the expectation of more than 30 days of surveillance (18). Nevertheless, mortality rates in the first 30 days were between 3.3-23.9% in the literature (3). Several literature studies reported that the mortality rates in the first 30 days; 10% by Schneider et al.(19), 10.7% by Leeds JS et al.(20), 5.5% by Lim JH. et al. (21). The different 30-day mortality rates in the literature were suggested to be associated with the differences among patient groups. This study reported that the mortality rates were 13.8% (10 patients) for the first 30 days, 22.2% (16 patients) for the first two months, and 33.3% (24 patients) for the first three months. Blomberg et al. (22) reported the mortality rate for the first two months as 18% (85 patients) in their study consisting of 484 patients. The current literature recommends PEG for patients who need enteral nutrition for more than 3-4 weeks with the surveillance expectation of more than 30 days, however, given the mortality rates in line with the literature, we should question the expectation for surveillance in patients who are planned to undergo PEG.

When evaluating mortality and underlying disease, no statistically significant result was found. One of the controversial issues in the literature in recent years is the PEG indication in dementia patients and its contribution to surveillance. In their study on 184 undernourished elderly patients, Ticinesi et al. (23) suggested that 54 patients who underwent PEG had a higher risk of mortality than the non-treated group. Ayman AR, et al. (12) divided 392 patients into three groups: 165 dementia, 124 cerebrovascular diseases, 103 head and neck tumors and motor neuron disease. They suggested that PEG insertion did not improve mortality and re-hospitalization rates in dementia patients as compared to other groups, on the contrary was associated with shorter surveillance. In their comparison study on 42 patients with dementia and 261 patients without dementia undergoing PEG procedure, Van Bruchem-Visser et al. (9) found that there was a shorter survival in dementia patients undergoing PEG procedure, while there was no significant difference in complication rates. The authors suggested that the surveillance expectation is evident in dementia patients, but the PEG procedure was applied due to ethical concerns. Lee YF. et al. (24) evaluated 12 studies consisting of 1805 patients in their meta-analysis and concluded that PEG procedure was associated

with increased complication rate and mortality in advanced dementia patients. Dietrich CG, et al. (8) showed in their review study that enteral nutrition is not beneficial in patients with advanced dementia, but it is beneficial in mild to moderate dementia patients. Our study did not find any significant differences in terms of surveillance among the dementia patients and other group patients undergoing PEG procedure, which has been discussed in recent years. The life expectancy after PEG procedure was significantly longer in patients over 70 years of age as compared to patients under 70 years of age, however, it was not considered as clinically significant.

In their literature studies, Chang WK, et al. (25) revealed that the PEG procedure has been used with increasing frequency and in a wider range of indications over the years. Among indications, malignancy patients were more common in the previous years, however, neurological diseases became more common over the years. Another important point in the study is that even though the procedure has become easier and safer to apply, post-procedural mortality rates have increased over the years. This condition may be explained by a broad spectrum of indications.

ESPEN guideline has also recommended that PEG should not be applied in terminal-stage patients, in the advanced dementia patients with the expectancy of short survival, and that it should be applied in patients who would benefit from the PEG procedure². The purpose of the PEG procedure is to provide nutritional support to the patient. In their study Löser et al. (6) showed that PEG procedure prevented weight loss in all patients groups having benign and malign etiology, and positive nutrition balance was obtained during follow up period. The main factor affecting surveillance in PG patients is the underlying disease. If there is an expectation of short survival in the case of advanced disease, we might suggest that the PEG procedure will not benefit the patient.

In conclusion: PEG procedure is described as a safe and easy-to-use, effective method of enteral nutrition, however, the increasing mortality and complication rates after the procedure in recent years has been drawing attention. It should be considered that short survival expectation is a relative contraindication of the PEG procedure. In the light of literature discussions, we suggest that consensus is needed for the surveillance expectation and procedure indications stated in guidelines for the right patient selection.

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