LESS

Original Article

Laparosc Endosc Surg Sci 2023;30(3):112-118
DOI: 10.14744/less.2023.93709

Evaluation of short-term outcomes of geriatric palliative care patients following percutaneous endoscopic gastrostomy application

Banu Yiğit,[1] Ömer Faruk Can,[1] Serkan Yılmaz,[1] Bülent Çitgez[2]

[1]Department of General Surgery, Elazig Fethi Sekin City Hospital, Elazig, Türkiye
[2]Department of General Surgery, Uskudar University Faculty of Medicine, Memorial Hospital, Istanbul, Türkiye

ABSTRACT

Introduction: Nowadays, percutaneous endoscopic gastrostomy (PEG) application is the preferred minimally invasive procedure for medium- and long-term enteral feeding in patients requiring palliative care. The presented study evaluated PEG-applied geriatric (>65 years old) patients staying in our hospital palliative care unit.

Materials and Methods: We assessed the medical data of PEG applied, by "pull" technique, >65-year-old patients from January 2019 to February 2023 in the palliative care unit of our hospital. Demographic characteristics of the patients, pre-procedure and 30th-day body weight, body mass index (BMI), serum albumin, and hemoglobin levels following PEG application were evaluated.

Results: No severe PEG-related complications were observed for 30-day follow-up. The BMI difference after PEG insertion in males and females was not significant (p>0.05 and p>0.05, respectively). Furthermore, albumin increase after PEG insertion in each gender was not significant (p>0.05 and p>0.05, respectively).

Conclusion: Nutrition through PEG tube is a safe, easy-to-practice procedure, but the advantages of PEG usage in geriatric patients who require palliative care remain unclear despite its popular application. In general, individual selections for PEG insertion in this particular geriatric patient group should be considered to obtain a positive nutritional status.

Keywords: Enteral nutrition, Gastrointestinal endoscopy, Gastrostomy, Geriatrics

Introduction

Palliative care is a model of care that provides optimum comfort, prevention of suffering, and improved quality of life. It has the ability to help people at all stages of illness or decline. Most people suffering from dementia are also appropriate for palliative care.[1,2] Nutrition is an essential component of palliative care, which aims to provide comfort and relief to patients with serious illnesses. Patients in palliative care may experience a range of symptoms that can affect their ability to eat, such as pain, nausea, vomiting, and fatigue. Proper nutrition can help to improve quality of life and alleviate some of these symp-

Received: 05.09.2023 **Revision:** 05.09.2023 **Accepted:** 12.09.2023
Correspondence: Banu Yiğit, M.D., Genel Cerrahi Kliniği, Elazığ Fethi Sekin Şehir Hastanesi, Elazığ, Türkiye
e-mail: banuyigit149@gmail.com

toms.[3,4] Nutritional support is basically given by two different ways, enteral or parenteral nutrition, and in some cases, a combination of these two routes. According to the guidelines, the first route of choice in nutritional support should be the enteral way.[5] On the other hand, parenteral nutrition is the second route to be chosen in cases where enteral nutrition cannot be applied or the nutritional requirements cannot be provided at the calculated level in long-term support. However, if there is no definite contraindication for the use of the enteral route, the administration of a small amount of enteral nutrition together with parenteral nutrition prevents intestinal bacterial overgrowth and translocation caused by bacteria passing through the intestinal mucosa, whose permeability is impaired for various reasons, to the lymphatic tract.[6]

A pathway of access to the gastrointestinal tract must be provided for enteral nutritional support. Today, percutaneous endoscopic gastrostomy (PEG) is considered the gold standard method for enteral feeding. PEG was first performed in 1979 at the Case Western Reverse University School of Medicine in Cleveland, USA, by general surgeon Ponsky and pediatric surgeon Gauderer.[7] All patients who have a functional digestive system and require enteral tube feeding for longer than 4 weeks are candidates for PEG insertion.[8] The most common indications for PEG tube placement are neurogenic dysphagia, followed by non-neurogenic causes of dysphagia. PEG is also used to fix the stomach to the abdominal wall as a treatment method in gastric volvulus, to provide palliation by gastric-intestinal decompression in intestinal obstruction caused by widespread intraperitoneal metastases, and to access the stomach with various surgical instruments in some special cases (e.g., phyto-trichobezoar).[9]

PEG can be performed with three different techniques: pull, push, and introducer. Among these three techniques, the pull technique is the most commonly used and has the lowest complication rate.[10] PEG tube insertion is often performed in the endoscopy unit, and if necessary, it can also be performed at the patient's bedside in the ward or intensive care unit. The procedure is mostly performed under sedoanalgesia and rarely general anesthesia. PEG, like other diagnostic and interventional endoscopic procedures, is a minimally invasive procedure with certain morbidity and mortality rates. In general, the morbidity and mortality rates related to the procedure depend on the additional comorbidities of the patients.[11,12]

PEG application, which is an access route to the digestive system for enteral nutrition support in the palliative care of geriatric patients, has not been adequately investigated. In parallel with the developing technology in recent years, the increase in the quality of endoscopy devices and the significant development of endoscopy methods allow us to apply this minimally invasive procedure in a more comfortable and safe way. In the presented study, we aimed to evaluate demographics and clinical data of PEG-applied geriatric patients in our palliative care unit.

Materials and Methods

We assessed the medical data of PEG applied >65-year-old patients in the palliative care unit of our hospital between January 2019 and February 2023. The patients who were not treated in our palliative care center were excluded. Table 1 shows the contraindications for PEG placement.

Pre-procedure Management

Informed consent for the PEG procedure was received from patients/legal guardians. Complete blood count, coagulation profile, hepatitis B and C, and HIV were made before the PEG application. We stopped the oral intake of all cases 8 h before the PEG insertion and administrated 1000 mg of cefazolin sodium (Sefazol® 1000 mg/4 mL) as a prophylactic antibiotic 1 h before the procedure.

Anesthesia Technique

An anesthesiologist administrated 1.5 mg/kg propofol (Propofol® %1 Fresenius 10 gr 20 mL) and 0.05 mg/kg midazolam (DORMICUM® 50 mg/10 mL) for sedoanalgesia.

Table 1. Contraindications for PEG placement

Hemodynamic instability
Sepsis
Severe ascites
Peritonitis
Abdominal wall infection at the selected site of placement
Marked peritoneal carcinomatosis
Interposed organs (e.g., liver, colon)
History of total gastrectomy
Gastric outlet obstruction (if being used for feeding)
Severe gastroparesis (if being used for feeding)
Lack of informed consent for the procedure

PEG: Percutaneous endoscopic gastrostomy.

PEG Tube Insertion Procedure

After completing a total upper gastrointestinal system endoscopy using Fujinon EG600WR Gastroscope, we applied the PEG tube by "pull" technique described by Gauderer et al.[7,9] In this technique, a guidewire is inserted through a needle through the abdominal wall into the stomach, grasped with an endoscopic snare, and then carried out through the esophagus and mouth. Finally, the string is fixed to the PEG tube's outer end, and the PEG tube is pulled from the mouth to the esophagus, stomach, and then out through the abdominal wall.

Post-procedure Care of PEG Tube

We began giving water 8 h after PEG application but restricted feeding until the next day due to peritoneal leakage risk. We checked the stoma (for signs such as discoloration, swelling, exudation, pus, and leakage around the PEG stoma) and cleaned it daily. The tube was flushed with warm water before and after each feed and medication administration and washed with soda water every night to forestall clogging and tube blockage.

Follow-up of the Patients

All patients were visited daily and examined by the same medical doctor during palliative care unit stay. The endoscopist also followed up the patients 24 h and the 3rd and 7th days of PEG tube placement to prevent early PEG-related complications. The dietitian of the hospital nutrition team took an active part in the follow-up and determining the nutritional requirements of each patient.

Compared Variables

Demographics, indications for PEG tube placement, pre-PEG and 30th-day body weight, body mass index (BMI), serum albumin (g/dL) and hemoglobin (gr/dL) levels following PEG application, PEG-related complications,[13] early (<7 days), and late (7–30 days) gastrointestinal problems after PEG insertion, duration of palliative care unit, 30 days survival after PEG application.

Ethical Approval Statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. In addition, the local ethics committee approved the study (Date: July 13, 2023, Number: 09–38).

Statistical Analysis

Demographics and categorical data were expressed as absolute or as frequencies. Continuous variables were presented as mean values and standard deviation. Fisher's exact test was applied to analyze the qualitative data. We assessed the data by the SPSS program (SPSS version 25.0, SPSS, Inc. Chicago, IL, USA). A $p<0.05$ was considered statistically significant.

Results

From January 2019 to February 2023, fifty-two geriatric cases staying in our hospital palliative care unit had PEG application in our endoscopy unit. Of the initial population screened, seven were excluded due to missing data, and two patients died during the 1-month follow-up period (2nd and 3rd weeks) (4.4%).

A total of 43 PEG-applied cases were included, 53.4% of whom were women. Neurological diseases (58%) and benign diseases (93%) are the foremost reasons for PEG application (Figs. 1 and 2). The mean age was 70.2±16.4 (range 66–93) years, and the mean BMI was 24.7±8.4 kg/m^2 (range 21–38). The mean PEG duration was 179.1 164.3 (2–324) days in males and 165±149.5 (4–297) days in females. Demographics and clinical data in terms of gender are given in Table 2.

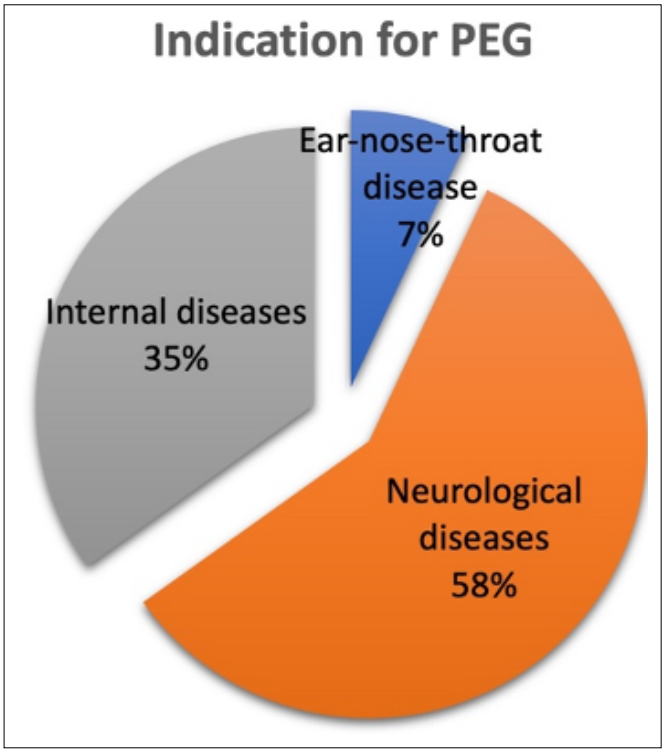

Figure 1. Indications for PEG placement and underlying disease.

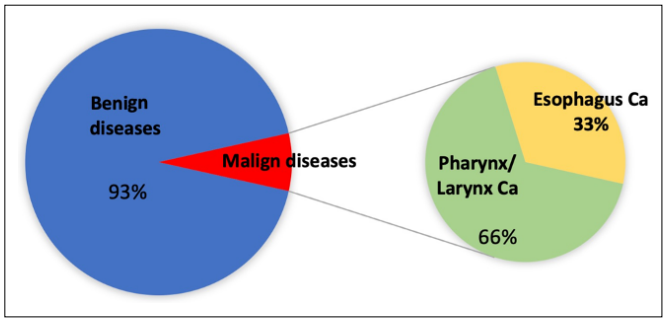

Figure 2. Ratio of benign and malign disease for PEG application.

Weight and BMI changes

The weight gain after PEG insertion in males and females was not significant (from 66.4±17, 8 to 68.2±16.1 in males, 54.6±15.2 to 56.2±18.6 in females) (p>0.05 and p>0.05, respectively). Furthermore, BMI difference after PEG insertion in males and females was not significant (from 25.2±9.9 to 26.4±8.7 in males, 23±7.8 to 24.2±6.9 in females) (p>0.05 and p>0.05, respectively).

Hemoglobin and Albumin Level Changes

The increase in hemoglobin levels in males and females was not significant (from 8.9±0.9 to 9.5±1.1 in males, 8.7±0.8 to 9.1±1.2 in females) (p>0.05 and p>0.05, respectively). Furthermore, albumin increase after PEG insertion in males and females was not significant (from 2.1±0.2 to 2.8±0.4 in males, 2.2±0.2 to 2.8±0.3 in females) (p>0.05 and p>0.05, respectively).

Table 2. Demographics and clinical data of PEG-applied patients

	Male (n=20)	Female (n=23)
Age (years), Mean±SD (min-max)	70.3±16.7 (67–92)	70.1±12.1 (66–93)
Hospital duration (days), Mean±SD (min-max)	47.3±11.2 (27–61)	43.8±10.4 (21–57)
PEG* duration (days), Mean±SD (min-max)	179.1± 164.3 (2–324)	165±149.5 (4–297)
Pre-PEG* weight (kg), Mean±SD (min-max)	66.4±17.8 (51–79)	54.6±15.2 (46–81)
After PEG* weight (kg), Mean±SD (min-max)	68.2±16.1 (53–87)	56.2±18.6 (51–83)
Pre-PEG* BMI* (kg/m^2), Mean±SD (min-max)	25.2± 9.9 (26–33)	23±7.8 (21–38)
After PEG* BMI* (kg/m^2), Mean±SD (min-max)	26.4±8.7 (24–34)	24.2±6.9 (23–38)
Pre-PEG* albumin (gr/dL), Mean±SD (min-max)	2.1±0.2 (1.9–2.5)	2.2±0.2 (1.9–2.5)
After PEG* albumin (gr/dL), Mean±SD (min-max)	2.8±0.4 (3–3.6)	2.8±0.3 (2.9–3.3)
Pre-PEG* hemoglobin (gr/dL), Mean±SD (min-max)	8.9±0.9 (7.5–11.2)	8.7±0.8 (6.7–11.5)
After PEG* hemoglobin (gr/dL), Mean±SD (min-max)	9.5±1.1 (9.7–12.8)	9.1±1.2 (8.7–12.1)
Indication for PEG*		
Ear-nose-throat disease, n (%)	2 (10)	1 (4.3)
Neurological disease, n (%)	11 (55)	14 (60.9)
Internal disease, n (%)	7 (35)	8 (34.8)
Benign disease, n (%)	18 (90)	22 (96.6)
Malign disease, n (%)	2 (10)	1 (4.3)
Complication		
Tube clogging, n (%)	4 (20)	7 (30.4)
Tube kinking, n (%)	2 (10)	2 (8.7)
Peristomal leak, n (%)	1 (5)	3 (13)
Tract infection, n (%)	2 (10)	3 (13)
Tube perforation, n (%)	2 (10)	2 (8.7)
Gastric perforation, n (%)	0 (0)	0 (0)
Peritonitis, n (%)	0 (0)	0 (0)
Aspiration, n (%)	0 (0)	0 (0)
Fever, n (%)	1 (5)	1 (4.3)

*BMI: Body mass index; PEG: Percutaneous endoscopic gastrostomy.

Morbidity and In-hospital Mortality

The mean hospital stay was 47.3±11.2 (range 27–61) days in males, 43.8±10.4 (range 21–57) days in females, and the 30-day mortality rate was 2.3% (n=1). Tube clogging 25.5% (n=11) and tract infection 11.6% (n=5) are the most observed complications following PEG insertion. No severe PEG-related complications were observed for 30 days follow-up. The most seen gastrointestinal adverse effect in the first 7 days is vomiting (n=7), and obstipation (n=2) is the most observed side-effect between the 7th and 30 days (Table 3).

Discussion

Palliative care is a form of medical care that focuses on improving the quality of life of patients with life-limiting illnesses such as cancer, heart disease, neurological conditions, and other chronic disorders. One of the key aspects of palliative care is managing the patient's symptoms, including pain, nausea, and appetite loss. In this context, feeding the patient is an important part of palliative care as it can help improve the patient's quality of life.[1,2] PEG application positively affects weight, BMI, blood albumin, and hemoglobin levels, which are fundamental parameters of adequate nutrition, in geriatric patients staying in palliative care units whose daily calorie and protein requirements cannot be provided orally.

Neurological disorders are the main reason for PEG placement in our cohort, consistent with previous studies' findings[14,15] and ESPEN guidelines on the feeding of geriatric patients.[16] However, no randomized controlled trials were found in the literature about the advantages or disadvantages of PEG on geriatric patients with neurological disorders. A Cochrane review focusing on PEG placement in geriatrics showed that all studies on this issue were observational. This Cochrane review decided the data giving no apparent advantage of PEG feeding in patients with neurological disorders. Moreover, they decided that there was no sign of edge of the PEG procedure in terms of improved nutritional state.[17]

Table 3. Gastrointestinal adverse effects observed after PEG application

	<7 days	7–30 days
Flatulence, n (%)	3 (6.9)	0 (0)
Nausea, n (%)	3 (6.9)	0 (0)
Vomiting, n (%)	7 (16.2)	1 (2.3)
Diarrhea, n (%)	5 (11.6)	1 (2.3)
Meteorism, n (%)	2 (4.6)	0 (0)
Obstipation, n (%)	2 (4.6)	2 (4.6)
Aspiration, n (%)	2 (4.6)	0 (0)

PEG: Percutaneous endoscopic gastrostomy.

PEG application is a well-known, reliable, cost-effective method for long-term nutrition. On the other hand, proper patient selection is crucial because mortality is high in acute illness, specific patient groups, and geriatric patients. The 1-month mortality rate ranges between 6.5% and 23.9%, and the 1-year mortality ratio is reported as more than half of the PEG-applied patients.[18,19] Johnston et al. said that of those patients dying within 1 month following PEG application, 40% died within the 1st week after the procedure.[20] This high mortality was most probably associated with the acute disease and underlying comorbidities and not with the PEG itself. Our mortality rate was 4.4% in the 1st month of the PEG procedure. This lower mortality rate may be related to the small number of patients who underwent the PEG procedure due to malignancy. Abuksis et al.[21] reported a 16.5% malignancy rate in their PEG-applied patients; this rate was 41.4% in Löser et al.'s study.[22]

Nutritional problems associated with PEG feeding were observed in 55.8% of our patients, and the leading cause was vomiting (16.2%) in the first 7 days; nevertheless, this rate decreased to 9.3% at the end of the 1st month. In contrast to different analyses,[23,24] we did not note aspiration during the follow-up. Although about 70% of PEG-related nutritional problems develop within the first 7 days of the procedure,[25] some cases still emerge after 1 year. Approximately all complications were mild and could be controlled adequately throughout. Unlike other studies,[15,23-25] we did not observe significantly higher complication rates in our cohort. The reason for this is not apparent but may be because of the low rate of patients with malignancy.

Unfortunately, the curative aim of the PEG procedure is not entirely well defined. The majority of the health professionals stated improved calorie/protein intake as the primary purpose of PEG feeding. Other purposes specified are improving patient comfort, increasing lifetime, enhancing strength, and assisting in overcoming an acute illness.[19] Data of the current study reveal that the primary goal, calorie/protein intake of PEG insertion, is not achieved in our research. The weight and BMI change or albumin/hemoglobin change are not significant following PEG application in our cohort. Even though most of the geriatric

patients in this investigation did not have positive progress in their nutrition or health state, some might claim that PEG feeding aims to reduce the decline speed, not reverse it. Although there is no nutritional status development following PEG application, the patient's death is easier for the family if they are imparted with the peace of mind that at least the patient is receiving a modicum of nourishment. The converse of this discussion is that PEG feeding could prolong the patient's death or suffering. However, we cannot find accurate solutions to these subjects because most patients cannot provide self-assessments.

Limitations of the Study

Our study has several significant weaknesses. The critical limitations of this study are its retrospective nature, the lack of data about various well-known risk factors such as secondary diagnoses and inflammation markers, which are notable predictors of a reduced lifetime in geriatric patients following PEG procedure, and short-time follow-up period. In addition, we do not have enough case numbers to create multivariate models that present more predictive outcomes. Furthermore, we had limited power to display variations in nutritional status between the groups expressing the most frequent reasons for the PEG procedure.

Conclusion

Nutrition through PEG tube is a safe, easy-to-practice procedure, but the advantages of PEG usage in geriatric patients who require palliative care remain unclear despite the popular application. We were incapable of documenting clinically significant benefits of PEG feeding in most of these patients. In general, individual selections for PEG insertion in this particular geriatric patient group should be considered to avoid significant bodyweight loss.

Disclosures

Ethichs Committee Approval: In addition, the local Ethics Committee approved the study (Date: July 13, 2023, Number: 09–38).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – B.Y., B.C.; Design – B.Y., B.C.; Supervision – B.C.; Materials-O.F.C., S.Y.; Data collection &/or processing – B.Y., O.F.C., S.Y.; Analysis and/or interpretation – B.Y., B.C.; Literature search – B.Y., O.F.C., S.Y.; Writing – B.Y., B.C.; Critical review – B.Y., B.C., O.F.C.

References

1. Etkind SN, Bone AE, Gomes B, Lovell N, Evans CJ, Higginson IJ, et al. How many people will need palliative care in 2040? Past trends, future projections and implications for services. BMC Med 2017;15:102.
2. Cadirci D, Ayazoz Y, Kocakoglu S. Evaluation of patients followed in a palliative care unit in Türkiye. Turk J of Geriatr 2021;24:227–34.
3. Baillie J, Anagnostou D, Sivell S, Van Godwin J, Byrne A, Nelson A. Symptom management, nutrition and hydration at end-of-life: A qualitative exploration of patients', carers' and health professionals' experiences and further research questions. BMC Palliat Care 2018;17:60.
4. Hurlow A. Nutrition and hydration in palliative care. Br J Hosp Med Lond 2019;80:78–85.
5. Druml C, Ballmer PE, Druml W, Oehmichen F, Shenkin A, Singer P, et al. ESPEN guideline on ethical aspects of artificial nutrition and hydration. Clin Nutr 2016;35:545–56.
6. Lloyd DA, Powell-Tuck J. Artificial nutrition: Principles and practice of enteral feeding. Clin Colon Rectal Surg 2004;17:107–18.
7. Gauderer MW, Ponsky JL, Izant RJ Jr. Gastrostomy without laparotomy: A percutaneous endoscopic technique. J Pediatr Surg 1980;15:872–5.
8. Bischoff SC, Austin P, Boeykens K, Chourdakis M, Cuerda C, Jonkers-Schuitema C, et al. ESPEN guideline on home enteral nutrition. Clin Nutr 2020;39:5–22.
9. Rahnemai-Azar AA, Rahnemaiazar AA, Naghshizadian R, Kurtz A, Farkas DT. Percutaneous endoscopic gastrostomy: Indications, technique, complications and management. World J Gastroenterol 2014;20:7739–51.
10. Hucl T, Spicak J. Complications of percutaneous endoscopic gastrostomy. Best Pract Res Clin Gastroenterol 2016;30:769–81.
11. Stenberg K, Eriksson A, Odensten C, Darehed D. Mortality and complications after percutaneous endoscopic gastrostomy: A retrospective multicentre study. BMC Gastroenterol 2022;22:361.
12. Nunes G, Fonseca J, Barata AT, Dinis-Ribeiro M, Pimentel-Nunes P. Nutritional support of cancer patients without oral feeding: How to select the most effective technique? GE Port J Gastroenterol 2020;27:172–84.
13. Holmes S. Enteral feeding and percutaneous endoscopic gastrostomy. Nurs Stand 2004;18:41–3.
14. Wirth R, Volkert D, Bauer JM, Schulz RJ, Borchelt M, Fleischhauer C, et al. PEG tube placement in German geriatric wards: A retrospective data-base analysis. Z Gerontol Geriatr [Article in German] 2007;40:21–30.
15. Wirth R, Voss C, Smoliner C, Sieber CC, Bauer JM, Volkert D. Complications and mortality after percutaneous endoscopic gastrostomy in geriatrics: A prospective multicenter observational trial. J Am Med Dir Assoc 2012;13:228–33.
16. Volkert D. Current ESPEN Guideline Clinical Nutrition and Hy-

dration in Geriatrics. Dtsch Med Wochenschr [Article in German] 2020;145:1306–14.

17. Ayman AR, Khoury T, Cohen J, Chen S, Yaari S, Daher S, et al. PEG insertion in patients with dementia does not improve nutritional status and has worse outcomes as compared with PEG insertion for other indications. J Clin Gastroenterol 2017;51:417–20.
18. Smoliner C, Volkert D, Wittrich A, Sieber CC, Wirth R. Basic geriatric assessment does not predict in-hospital mortality after PEG placement. BMC Geriatr 2012;12:52.
19. Callahan CM, Haag KM, Weinberger M, Tierney WM, Buchanan NN, Stump TE, et al. Outcomes of percutaneous endoscopic gastrostomy among older adults in a community setting. J Am Geriatr Soc 2000;48:1048–54.
20. Johnston SD, Tham TC, Mason M. Death after PEG: Results of the national confidential enquiry into patient outcome and death. Gastrointest Endosc 2008;68:223–7.
21. Abuksis G, Mor M, Plaut S, Fraser G, Niv Y. Outcome of percutaneous endoscopic gastrostomy (PEG): Comparison of two policies in a 4-year experience. Clin Nutr 2004;23:341–6.
22. Löser C, Wolters S, Fölsch UR. Enteral long-term nutrition via percutaneous endoscopic gastrostomy (PEG) in 210 patients: A four-year prospective study. Dig Dis Sci 1998;43:2549–57.
23. Mukaino M, Ohtsuka K, Tsuchiyama K, Matsuda F, Inagaki K, Yamada J, et al. Feasibility of a simplified, clinically oriented, three-dimensional gait analysis system for the gait evaluation of stroke patients. Prog Rehabil Med 2016;1:20160001.
24. Tomioka H, Yamashita S, Mamesaya N, Kaneko M. Percutaneous endoscopic gastrostomy for aspiration pneumonia: A 10-year single-center experience. Respir Investig 2017;55:203–11.
25. Miranda LE, Penha MRCD, Miranda ACG, Lima DL, Costa MWF, Amorim AO. Risk factors associated with early mortality after percutaneous endoscopic gastrostomy in patients at a tertiary care center in Brazil: A retrospective single-center survival study. Arq Gastroenterol 2019;56:412–8.