

# Survival outcomes of percutaneous endoscopic gastrostomy, comparison of cerebrovascular event and non-cerebrovascular event in malnourished patients

Perkütan endoskopik gastrostomi'nin sağkalım sonuçları, serebrovasküler olay geçiren ve geçirmeyen kötü beslenen hastaların karşılaştırılması

Yaşar Küçükardalı<sup>1</sup>, Murat Hakan Terekeci<sup>1</sup>, Arzu Yalçın<sup>1</sup>, Rahman Nurmuhammedov<sup>1</sup>, Cengiz Pata<sup>2</sup>, Sibel Temür<sup>3</sup>, Ferda Fatma Kartufan<sup>3</sup>, Hakan Şilek<sup>4</sup>, Nazlı Şişik Yaltırık<sup>5</sup>, Elif Çiğdem Altunok<sup>6</sup>

<sup>1</sup> Department of Internal Medicine, Yeditepe University Faculty of Medicine, Istanbul, Turkey  
<sup>2</sup> Department of Gastroenterology, Yeditepe University Faculty of Medicine, Istanbul, Turkey  
<sup>3</sup> Department of Anesthesiology and Reanimation, Yeditepe University Faculty of Medicine, Istanbul, Turkey  
<sup>4</sup> Department of Neurology, Yeditepe University Faculty of Medicine, Istanbul, Turkey  
<sup>5</sup> Department of Nutrition and Diet, Yeditepe University Faculty of Medicine, Istanbul, Turkey  
<sup>6</sup> Department of Statistics, Yeditepe University Faculty of Medicine, Istanbul, Turkey

ORCID ID of the author(s)

YK: 0000-0002-8719-8886  
MHT: 0000-0003-2045-1709  
AY: 0000-0002-1941-8699  
RN: 0000-0002-7345-6741  
CP: 0000-0003-1950-0534  
ST: 0000-0002-4494-2265  
FFK: 0000-0002-5592-2366  
HŞ: 0000-0002-6550-6200  
NŞY: 0000-0002-8342-7848  
EÇA: 0000-0002-2979-1236

Corresponding author / Sorumlu yazar:  
Arzu Yalçın

Address / Adres: Yeditepe Üniversitesi, İç Hastalıkları Anabilim Dalı, İstanbul, Türkiye  
e-Mail: arzu.yalcin@yeditepe.edu.tr

Ethics Committee Approval: The Ethical approval was obtained for the study from the Yeditepe University Clinical Trials Ethical Committee (Approval form number: 342) on 18 June 2013. Etik Kurul Onayı: Çalışma için 18 Haziran 2013 tarihinde Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu'ndan (Onay formu no: 342) etik onay alındı.

Conflict of Interest: No conflict of interest was declared by the authors.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Financial Disclosure: The authors declared that this study has received no financial support.

Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

Published: 11/16/2019  
Yayın Tarihi: 16.11.2019

Copyright © 2019 The Author(s)  
Published by JOSAM

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License 4.0 (CC BY-NC-ND 4.0) where it is permissible to download, share, remix, transform, and build up the work provided it is properly cited. The work cannot be used commercially without permission from the journal.



**How to cite / Atf için:** Küçükardalı Y, Terekeci MH, Yalçın A, Nurmuhammedov R, Pata C, Temür S, Kartufan FF, Şilek H, Yaltırık NŞ, Altunok EŞ. Survival outcomes of percutaneous endoscopic gastrostomy, comparison of cerebrovascular event and non-cerebrovascular event in malnourished patients. J Surg Med. 2019;3(11):796-799.

## Introduction

If the enteral system is functional but the oral intake is not possible, feeding via percutaneous endoscopic gastrostomy (PEG) is preferred instead of the nasoenteral route [1]. Feeding via PEG is the most preferred long-term enteral feeding method due to easy and expeditious applicability and the lack of requirement for general anesthesia or operating room facilities. Due to the increased lifespan of the elderly population, accompanying diseases have also rocketed. Some of these patients encounter problems due to absent or improper nutrition. Stroke is the most prominent condition that negatively affects nutrition in the elderly patients. Pneumonia can increase mortality rates in stroke patients. Şimşek et al. [2] performed a cohort study about mortality factors, especially pneumonia, at stroke, and found mortality rate to be 30.4%. PEG feeding is a preferred feeding method which may reduce the risk of pulmonary infections in long-term coma patients due to stroke or traumatic brain injury [3]. Joundi and coworkers [4] reported that gastrostomy and jejunostomy placement after stroke was associated with lowering 30-day mortality. However, the contribution of PEG feeding to the quality of life and the survival rate is still controversial in the elderly population suffering from certain diseases.

In this study, we aimed to compare the demographic characteristics, 30, 90, 180 and 365-day survival rates, duration of PEG patency, clinical and laboratory nutritional parameters between patients in need of PEG for enteral feeding due to cerebrovascular event (CVE) or other causes.

## Materials and methods

Ethics approval was obtained from Yeditepe University Clinical Trials Ethics Committee (Approval form number: 342) on 18 June 2013. Patients over 18 years of age who underwent PEG placement procedure between January 2009 and January 2015 at Yeditepe University Hospital were included in this study, and relevant patient information was obtained from patient files and hospital registry. This study was conducted in accordance with the principles of the Declaration of Helsinki, and in compliance with all international and national laws and regulations. Patients gave their written informed consent before any procedure was performed.

Investigators conducted the interviews by phone with the family members with their consent. A gastroenterologist performed the PEG placement procedures in the endoscopy unit under intravenous sedation, local anesthetics and using the pull method with a 20F silicone tube. Before the procedure, intravenous cefuroxime was administered for prophylaxis.

Patients were divided into CVE group and non-CVE group (those with esophageal tumors, head and neck tumors, brain tumors, amyotrophic lateral sclerosis (ALS), and terminal dementia) based on the indications for PEG placement.

A total of 130 patients underwent PEG placement procedure, among which 92 patients' data were obtained. All patients' pre-PEG and post-PEG body mass indexes (BMI), hemoglobin (Hb), albumin (alb), creatinine (Cr), and C-reactive protein (CRP) levels, white blood cell counts and complications (mechanical, metabolic, and infectious) were compared.

## Statistical analysis

The data were expressed as mean (SD), median and with 95% confidence interval. Log-rank test and Kaplan Meier Curve were used for survival analysis. SPSS v22 software was used for statistical analysis.

## Results

Among the 92 patients included, 27 were female and 65 were male. The mean age of all patients was 63 (39) years. Overall, the mortality rate during the six-year follow-up was 63%. The mean age, total survival and median survival rates according to follow-up visits after PEG, PEG patency, 30-day, 90-day, 180-day and one year total survival and median survival rates in CVE (65 patients) and non-CVE group (27 patients) are presented in Table 1.

The mean age was lower and 90-day survival rate was higher in the CVE group. There was no revelatory variation in terms of other parameters. Hemoglobin, CRP, albumin, creatinine, white blood cell count, and BMI parameters did not significantly differ between the groups before and after feeding via PEG (Table 2). Twenty six (40%) of the 65 patients with PEGs placed due to CVE had mechanical, five (8%) had metabolic and 29 (45%) had infectious complications, while 15 (55%) of the 27 patients with PEG placed due to non-CVE causes had mechanical, four (15%) had metabolic and 13 (55%) had infectious complications.

Table 1: Survival, lifespan of PEG and median survival at the CVE and non-CVE patients

	CVE (n=65) Mean(SD)	Non-CVE (n=27) Mean(SD)	P-value
Age (y)	58(18)	74(19)	0.001
After peg follow-up (month)	19(17)	14(13)	0.255
Lifespan with PEG (month)	12(10)	9(8)	0.374
Median survival (month)	20(13)	20(12)	0.274
Survival (%)			
30 d	94	92	0.694
90 d	78	55	0.041
180 d	61	50	0.391
1 y	56	50	0.637
Total (end of the study)	39	33	

CVE: Cerebrovascular event, PEG: Percutaneous Endoscopic Gastrostomy, SD: standard deviation, D: days, Y: year

Table 2: Comparing of the beginning and the last laboratory findings at the CVE and non-CVE patients

	CVE n: 65			Non-CVE n: 27		
	First Mean(SD)	Last Mean(SD)	P-value	First Mean(SD)	Last Mean(SD)	P-value
Hemoglobin (gr/dl)	11.9(1.8)	11.8(1.7)	0.145	10.8(1.4)	10.9(1.7)	0.156
CRP (mg/dl)	38(31)	52(45)	0.779	52(39)	39(29)	0.588
Albumin (gr/dl)	3.4(0.6)	3.3(0.4)	0.275	3.0(0.5)	3.4(0.4)	0.224
Creatinine (mg/dl)	0.67(0.31)	0.7(0.5)	0.135	0.69(0.29)	0.65(0.34)	0.423
Leucocyte	9.1(3.8)	8.9(3.3)	0.050	9.8(3.1)	9.2(2.7)	0.990
BMI (kg/m <sup>2</sup> )	24.7(5.1)	22.8(3.5)	0.131	20.9(4.5)	19.5(3.2)	0.158

CVE: Cerebrovascular event, SD: standard deviation, CRP: C-reactive protein

In the CVE and non-CVE groups, the oral intakes of the patients were 4% and 13%, respectively ( $P=0.189$ ), and the need of total parenteral nutrition (TPN) was 27% and 22%, respectively ( $P=0.594$ ). Mixed feeding rates were 17% in the CVE group and 14% in the non-CVE group ( $P=0.077$ ). At the termination of the study, PEG functionality in the CVE and non-CVE groups were 10% and 14%, respectively ( $P=0.334$ ). The survival rates of the groups are presented in Figure 1. According to the Kaplan-Meier survival analysis, there was no significant difference between median survival rates (20 (13) months versus 20 (12) months ( $P=0.274$ )) (Figure 2).

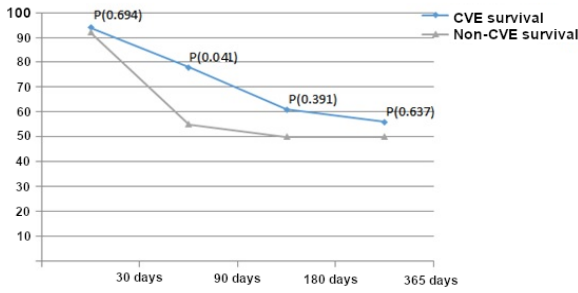


Figure 1: Survival rates of the groups

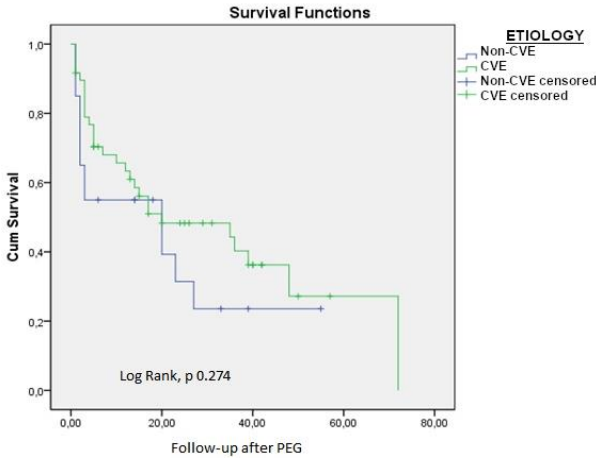


Figure 2: Median survival rates

The ratios of patients who were orally fed in the following months are shown in Table 3. At the end of one year, 21% of the patients in the CVE group and 12% in the non-CVE group were orally fed.

Table 3: Feeding without PEG ratios at the CVE and non-CVE patients at the proceeding months

Days (d)	CVE group		Non-CVE group		Patient feeding with PEG%
	Patient %	Patient feeding without PEG%	Patient %	Patient feeding without PEG%	
30 d	94	10	92	11	81
90 d	78	8	55	7	48
180 d	61	14	47	2	48
365 d	56	21	50	12	38

CVE: Cerebrovascular event, PEG: Percutaneous Endoscopic Gastrostomy, D: days

## Discussion

In the last 20 years, seven international and 17 national studies on PEG case series have been conducted in this country. Among these, 15 neurological patients were studied by Bayraktar et al. [5] and 5 neurological patients were evaluated by Muftuoglu et al. [6]. In the remaining studies, neurological/paralytic subgroup analysis was not performed. Therefore, our study is a pioneer in this field in the country.

The 30-day mortality rate in the study was 6% in the CVE group, while in many studies the 30-day mortality after the PEG has been reported between 18% and 25% [7-11]. The lower 30-day mortality rate in this study may be associated with non-problematic values of baseline BMI, hemoglobin, albumin, creatinine, white blood cell count and a low average of subject ages. In the study conducted by Mitchell and Tetroe, factors such as age, malignancy, male sex, and hypoalbuminemia were found to be associated with increased mortality [12]. Albeit insignificant, higher CRP levels as well as lower BMI and albumin values before PEG placement in the non-CVE group may explain the significantly low 90-day survival rates compared to the CVE group (Table 1). Likewise, Blomberg et al. [13] also demonstrated a seven-fold increase in mortality rates in patients

with low albumin, high CRP, BMI <18.5 and >65 years of age compared to patients with normal albumin and CRP values.

In this study, the prevalence of infectious complications after PEG placement was 55% in the non-CVE group and 45% in the CVE group. Higher CRP levels in the non-CVE group before PEG placement may be the reason for the rise in infectious complications.

In Malmgren et al.'s study [14] on 201 stroke patients with a mean age of 81 years, the 90-day and one-year mortality rates were 46% and 67%, respectively. The same rates in our study turned out lower with 22% 90-day mortality and 44% one-year mortality in the CVE group (mean age: 58 years). In a study performed by Callahan et al. [8] on 150 patients, the one-year mortality rate was similarly 47%. The lower average age in this trial could be the reason of lower mortality rate. Median survival span in James et al.'s study [15] was 305 days, while in the current study, it was twenty months (600 days) in the CVE group. James et al. [15] conducted this study in stroke patients with dysphagia between 1991-1995 and reported the demise of twenty-eight percent of the cases due to aspiration pneumonitis during hospital stay.

The low median survival rate may be related to the fact that in those years, experience with the PEG placement technique was constrained and patient monitoring was not as thorough as today.

Studies investigating the natural course of dysphagia following CVE showed that it spontaneously resolved in 7-14 days after the event in 73%-86% of patients [7,17,18]. Thus, it may be recommended to wait for 2-3 weeks before PEG placement in CVE cases.

In this study, 10% of the patients in the CVE group could be fed without PEG toward the finish of the first month, while 21% of the subjects could be orally fed at the end of the first year. In the non-CVE group, the ratios were determined as 11% and 12%, respectively. The proportion of feeding without PEG did not increment in the forthcoming time frames.

The ESPEN guideline [1] assesses the outcomes of the FOOD [17] and other studies on enteral nutrition in CVE patients with dysphagia and recommends that enteral nutrition should be initiated at the earliest opportunity except in contradictory cases in geriatric patients. Feeding via PEG should be favored over nasogastric tube due to better nutritional support and better long-term treatment outcomes [18].

### Limitations

There are various limitations to our study, the first one being the unevenly distributed gender. There were 37 females and 65 males. Secondly, the time between the baseline laboratory tests obtained before PEG placement and the last laboratory tests was not equal in all patients. Both limitations may have confounded the results.

### Conclusion

PEG is recently considered to reduce mortality in selective populations. In our study, although 3-month survival rates after PEG placement was higher in the CVE group, no significant difference was detected in terms of survival rates between the groups at one year and overall follow-up times. Mortality rate was lower than many other studies. However, there are also studies showing an increase in mortality in the first

months, especially in CVE patients. Mortality studies in elderly and PEG-placed patients have varying results. Further studies with higher number of patients and more homogeneously distributed age and gender groups are needed to illuminate the advantages and disadvantages of PEG placement.

## References

1. Volkert D, Berner YN, Berry E, Cederholm T, Coti Bertrand P, Milne A, et al. ESPEN guidelines on enteral nutrition: geriatrics. *Clin Nutr.* 2006;25:330-60.
2. Şimşek KB, Özer G. Evaluation of stroke mortality and related risk factors: A single-center cohort study from Gaziantep, Turkey. *J Surg Med.* 2019;3(3):231-4.
3. Song RR, Tao YF, Zhu CH, Ju ZB, Guo YC, Ji Y. Effects of nasogastric and percutaneous endoscopic gastrostomy tube feeding on the susceptibility of pulmonary infection in long-term coma patients with stroke or traumatic brain injury. *Zhonghua Yi Xue Za Zhi.* 2018 Dec 25;98(48):3936-40.
4. Joundi RA, Saposnik G, Martino R, Fang J, Kapral MK. Timing of Direct Enteral Tube Placement and Outcomes after Acute Stroke. *J Stroke Cerebrovasc Dis.* 2019 Sep 28:104401.
5. Bayraktar Y, Koseoglu T, Sivri B, Kansu T, Kayhan B, Varli K, et al. PEG in patients with complete dysphagia due to neurological diseases. *Turk J Gastroenterol.* 1993;4(4):664-7.
6. Muftuoglu M, Erturk O, Karinoglu M, Gurer S, Yilmaz H, Akin O, et al. PEG in neurological diseases: Indications and complications. *Turk J Gastroenterol.* 1995;6(1):128-31.
7. Skelly RH, Kupfer RM, Metcalfe ME, Allison SP, Holt M, Hull MA, et al. Percutaneous endoscopic gastrostomy (PEG): change in practice since 1988. *Clin Nutr.* 2002;Oct;21(5):389-94.
8. 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.
9. Fisman DN, Levy AR, Gifford DR, Tamblyn R. Survival after percutaneous endoscopic gastrostomy among older residents of Quebec. *J Am Geriatr Soc.* 1999;47:349-53.
10. Fraser GM, Abuksis G, Mor M, Segal N, Shemesh I, Plout S, et al. Percutaneous endoscopic gastrostomy: high mortality rates in hospitalized patients. *Am J Gastroenterol.* 2000;95:128-32.
11. Ha L, Hauge T. Percutaneous endoscopic gastrostomy (PEG) for enteral nutrition in patients with stroke. *Scand J Gastroenterol.* 2003;9:962-6.
12. Mitchell SL, Tetroe JM. Survival after percutaneous endoscopic gastrostomy placement in older persons. *J Gerontol A Biol Sci Med Sci.* 2000;Dec;55(12):735-9.
13. Blomberg J, Lagergren P, Martin L, Mattsson F, Lagergren J. Albumin and C-reactive protein levels predict short-term mortality after percutaneous endoscopic gastrostomy in a prospective cohort study. *Gastrointest Endosc.* 2011;Jan;73(1):29-36.
14. Malmgren A, Hede GW, Karlström B, Cederholm T, Lundquist P, Wirén M, et al. Indications for percutaneous endoscopic gastrostomy and survival in old adults. *Food Nutr Res* 2011; 55:6037.
15. James A, Kapur K, Hawthorne AB. Long-term outcome of percutaneous endoscopic gastrostomy feeding in patients with dysphagic stroke. *Age Ageing* 1998;Nov;27(6):671-6.
16. Dennis MS, Lewis SC, Warlow C; FOOD Trial Collaboration. Effect of timing and method of enteral tube feeding for dysphagic stroke patients (FOOD): a multicenter randomized controlled trial. *Lancet* 2005;365:764-72.
17. Smithard DG, O'Neill PA, England RE, Park CL, Wyatt R, Martin DF et al. The natural history of dysphagia following a stroke. *Dysphagia* 1997;Fall;12(4):188-93.
18. Gordon C, Hewer RL, Wade DT. Dysphagia in acute stroke. *Br Med J (Clin Res Ed).* 1987 Aug 15;295(6595):411-4.

This paper has been checked for language accuracy by JOSAM editors.

The National Library of Medicine (NLM) citation style guide has been used in this paper.

Suggested citation: Patrias K. Citing medicine: the NLM style guide for authors, editors, and publishers [Internet]. 2nd ed. Wendling DL, technical editor. Bethesda (MD): National Library of Medicine (US); 2007-[updated 2015 Oct 2; cited Year Month Day]. Available from: <http://www.nlm.nih.gov/citingmedicine>