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PEG-Related Complications and One-Year Survival in Patients with Neurological Disorders: A Retrospective Cohort Study

Guvenc Diner

guvencdiner@yahoo.com

Mersin Sehir Research and Training Hospital https://orcid.org/0000-0002-7732-4092

Guven Erdogrul

Mersin Sehir Research and Training Hospital

Boran Karakus

Mersin Sehir Research and Training Hospital

Aydın Karahan

Mersin Sehir Research and Training Hospital

Recep Caglar

Mersin Sehir Research and Training Hospital

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Manuscript Title

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Running Title

PEG Complications and One-Year Survival

Authors

1. Guvenc Diner, MD[1]
2. Guven Erdogrul,MD[1]
3. Boran Cihat Karakus,MD[1]
4. Aydın Karahan,MD[2]
5. Recep Caglar,MD[1]

Affiliations

[1] Department of General Surgery, Mersin City Training and Research Hospital, Mersin, Türkiye

[2] Department of Neurological Intensive Care,Mersin City Training and Research Hospital, Mersin, Türkiye

Corresponding Author

Guvenc Diner, MD
Department of General Surgery
Mersin City Training and Research Hospital
Mersin, Türkiye

E-mail: guvencdiner@yahoo.com
ORCID: 0000-0002-7732-4092

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Tables and Figures

3 Tables and 1 Figure

Keywords

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Ethics Approval

The study protocol was reviewed and approved by the Ethics Committee of Mersin City Training and Research Hospital (Approval No. 2026/353). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Informed Consent

Because of the retrospective nature of the study, individual informed consent was waived in accordance with the decision of the institutional ethics committee.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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Data Availability

The datasets generated and/or analyzed during the current study are not publicly available because they contain institutional patient-level data but may be available from the corresponding author upon reasonable request, subject to institutional and ethical restrictions.

Author Contributions

G.D.: Conceptualization, study design, data collection, statistical analysis, interpretation of the results, and manuscript preparation.

G.E.: Data collection, clinical evaluation, interpretation of the results, and critical revision of the manuscript.

BCK:Data collection, clinical evaluation

AK:Data collection

RC:Data collection

All authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

PEG-Related Complications and One-Year Survival in Patients with Neurological Disorders: A Retrospective Cohort Study

Abstract

Background: Percutaneous endoscopic gastrostomy (PEG) is frequently used to provide long-term enteral nutrition in patients with neurological disorders and persistent dysphagia. Despite its widespread use, PEG-related morbidity and post-procedural survival remain variable, particularly in patients with substantial neurological and systemic disease burden. We aimed to characterize PEG-related complications and one-year overall survival and to identify baseline factors independently associated with these outcomes.

Methods: We conducted a retrospective single-center cohort study of 276 consecutive adults with neurological disorders who underwent PEG placement at Mersin City Training and Research Hospital between January 2017 and December 2025. PEG-related complications were assessed throughout the available post-procedural follow-up. The primary survival endpoint was all-cause mortality within 365 days of PEG placement. Multivariable logistic regression was used to evaluate independent predictors of PEG-related complications, while one-year overall survival was estimated using the Kaplan–Meier method. A prespecified multivariable Cox proportional hazards model assessed the associations of age, sex, C-reactive protein (CRP), and serum albumin with one-year mortality.

Results: PEG-related complications occurred in 76 patients (27.5%). The most frequently documented events were PEG-site discharge (26.3%), tube dislodgement (25.0%), tube obstruction (14.5%), PEG-site bleeding (11.8%), and tube migration (10.5%). After multivariable adjustment, increasing age was independently associated with a lower likelihood of documented PEG-related complications (odds ratio [OR] per 10-year increase, 0.758; 95% confidence interval [CI], 0.634–0.908; P=.003). Neither female sex (OR, 1.701; 95% CI, 0.972–2.975; P=.063), CRP (OR per 10 mg/L, 0.999; 95% CI, 0.952–1.048; P=.962), nor albumin (OR per 1 g/dL, 1.010; 95% CI, 0.850–1.199; P=.913) was independently associated with complications. During available follow-up, 75 patients (27.2%) died; 63 deaths occurred within 365 days among patients with evaluable death dates. Estimated one-year overall survival was 76.4%. In the prespecified Cox model, none of the evaluated baseline variables was independently associated with one-year mortality: age (hazard

ratio [HR], 0.923; P=.326), female sex (HR, 0.930; P=.779), CRP (HR, 1.037; P=.061), and albumin (HR, 1.061; P=.295).

Conclusions: In this consecutive cohort of patients with neurological disorders undergoing PEG placement, more than one-quarter experienced a documented PEG-related complication, whereas approximately three-quarters remained alive at one year. Increasing age was independently associated with fewer documented PEG-related complications, but the prespecified demographic, inflammatory, and nutritional variables did not independently predict one-year mortality. These findings underscore the clinical heterogeneity of neurological patients receiving PEG and support individualized risk assessment rather than reliance on isolated baseline biomarkers. Prospective multicenter studies incorporating standardized measures of neurological severity, functional status, nutritional risk, and time-dependent complications are warranted to improve outcome prediction.

Keywords: percutaneous endoscopic gastrostomy; PEG-related complications; neurological disorders; one-year survival; mortality; C-reactive protein; albumin

Introduction

Percutaneous endoscopic gastrostomy (PEG) is an established route for long-term enteral nutrition in patients who cannot maintain adequate oral intake despite a functional gastrointestinal tract. Compared with surgical gastrostomy, PEG offers a minimally invasive approach and has become an important component of supportive care for patients with persistent dysphagia and prolonged nutritional requirements [1–5]. Current clinical guidance emphasizes individualized assessment of indication, expected benefit, nutritional status, and procedural risk rather than viewing PEG placement as an isolated technical intervention [26,27].

Neurological disorders are among the most common indications for PEG because stroke, intracranial hemorrhage, dementia, neurodegenerative disease, amyotrophic lateral sclerosis, traumatic neurological injury, and other disorders may cause persistent dysphagia and inadequate oral intake. In these patients, the decision to establish durable enteral access is closely linked to the expected trajectory of neurological recovery, nutritional needs, functional status, and comorbidity burden [13,18,23,26].

PEG is generally safe, but adverse events remain clinically important. Complications include peristomal leakage or discharge, infection, bleeding, tube obstruction, accidental dislodgement, migration, and, less commonly, major intra-abdominal or systemic events. Long-term gastrostomy literature suggests that tube displacement, infection, and other stoma-related events remain relevant after the initial procedure, and complication estimates vary according to definitions and duration of follow-up [6,7,28]. Recent evidence also confirms that complication rates and mortality differ substantially according to indication and baseline clinical status [29,32–35].

Survival after PEG is similarly heterogeneous. In neurological populations, mortality is often driven by the underlying neurological disorder, frailty, comorbid disease, inflammation, and nutritional or physiological reserve rather than by the PEG procedure itself [16–18,22–24]. Serum albumin has repeatedly been investigated as a prognostic marker after PEG, although its interpretation requires caution because it is also affected by inflammation, fluid balance, hepatic function, and chronic disease [17,33]. Recent cohorts continue to support the prognostic relevance of albumin and inflammatory markers while highlighting the heterogeneity of PEG populations [30,32,35].

The present study evaluated PEG-related complications and one-year overall survival in a consecutive cohort of adults with neurological disorders undergoing PEG placement. We hypothesized that baseline demographic, inflammatory, and nutritional/physiological characteristics would be associated with post-PEG complications and mortality. The primary outcomes were any documented PEG-related complication and all-cause mortality within 365 days; the secondary objective was to identify independent baseline predictors of these outcomes.

Materials and Methods

Study Design and Patient Population

This retrospective single-center cohort study was conducted at Mersin City Training and Research Hospital. Adults with neurological disorders who underwent PEG placement between January 2017 and December 2025 were identified from institutional electronic medical records and PEG procedure records. A total of 276 consecutive eligible patients were included. Time-to-event analysis included 268 patients because eight patients had a documented death in the medical record but lacked a sufficiently reliable date of death to permit valid time-to-event estimation. These patients were therefore retained in descriptive mortality analyses but excluded from the Kaplan–Meier and Cox analyses. The cohort comprised patients with neurological conditions requiring

long-term enteral nutritional support, including cerebrovascular disease, intracranial hemorrhage, dementia, intracranial tumor, cerebral palsy, amyotrophic lateral sclerosis, epilepsy, myasthenia gravis, and other neurological or medical conditions documented as the primary PEG indication.

Eligibility criteria were age ≥18 years, PEG placement during the study period, and availability of the clinical and laboratory information required for the prespecified analyses. Patients with insufficient documentation of PEG-related complications or survival status were excluded. Patients were not selected according to outcome status.

Study Outcomes and Definitions

The coprimary outcomes were (1) occurrence of at least one PEG-related complication during available post-PEG follow-up and (2) all-cause mortality within 365 days after PEG placement. A PEG-related complication was defined as an adverse event directly involving the PEG tube, PEG tract, or insertion site. Documented events included PEG-site discharge, tube dislodgement, tube obstruction, PEG-site bleeding, tube migration, leakage around the PEG site, and other documented tube-related events.

Complication ascertainment was performed throughout the available post-PEG follow-up rather than being restricted to 365 days. This approach was selected to characterize the real-world burden of PEG-related events, including delayed tube- and stoma-related complications. Complication occurrence was analyzed as a separate outcome and was not used as a fixed baseline covariate in the one-year survival model because a complication can occur only after PEG placement and after the patient has remained alive long enough for the event to occur. Treating complication status as an ordinary baseline predictor could therefore introduce immortal-time or other temporal bias. The one-year mortality analysis was restricted to baseline characteristics measured at or around PEG placement. Future studies with exact dates of complications could evaluate these events as time-dependent covariates.

Data Collection

Demographic variables included age and sex. Clinical variables included the primary indication for PEG and documented comorbidities. Indications were grouped into mutually exclusive categories according to the principal diagnosis recorded in the medical record: cerebrovascular disease, intracranial hemorrhage (including spontaneous and traumatic hemorrhage), dementia, intracranial tumor, cerebral palsy, amyotrophic lateral sclerosis, epilepsy, myasthenia gravis, and other neurological or medical conditions. Comorbidities were not mutually exclusive and included

hypertension, diabetes mellitus, coronary artery disease, atrial fibrillation, dementia, epilepsy, amyotrophic lateral sclerosis, chronic kidney disease, and malignancy.

Laboratory variables obtained around the time of PEG placement included serum CRP (mg/L) and serum albumin (g/dL). Because the study was retrospective, the timing of laboratory sampling reflected routine clinical practice. The available dataset did not provide standardized longitudinal nutritional assessments such as body weight trajectory, BMI, NRS-2002, or the Subjective Global Assessment; these limitations were considered when interpreting albumin.

PEG Procedure and Assessment of Complications

PEG placement was performed using the standard endoscopic gastrostomy technique according to institutional practice. Patients were clinically monitored after the procedure, and tube- and stoma-related events were recorded in the institutional database and medical records. Follow-up began on the date of PEG placement. For survival analysis, patients who died within 365 days were assigned their observed time to death. Patients without an observed death were censored at the date of their last available follow-up or at 365 days, whichever occurred first. PEG-related complications were defined as any adverse event directly associated with the PEG tube or insertion site occurring throughout the available follow-up period. The presence or absence of at least one complication was recorded for each patient.

The complications documented in the study database included PEG-site discharge, tube dislodgement, tube obstruction, PEG-site bleeding, tube migration, leakage around the PEG site, and other documented tube-related events. For statistical analyses, patients were initially classified into two groups according to the presence or absence of any PEG-related complication: the complication group and the non-complication group. The types of complications were subsequently evaluated descriptively.

Statistical Analysis

Continuous variables were assessed for distribution using the Shapiro–Wilk test and graphical methods. Normally distributed variables are reported as mean ± standard deviation, and non-normally distributed variables as median and interquartile range (IQR). Categorical variables are reported as counts and percentages. Baseline characteristics were compared using the independent-samples t test or Mann–Whitney U test, as appropriate, and the Pearson chi-square or Fisher exact test for categorical variables.

The multivariable analyses were deliberately prespecified and parsimonious rather than based solely on univariable P values. Age, sex, CRP, and albumin were retained as covariates because they were consistently available in the dataset and represented demographic, inflammatory, and nutritional/physiological domains that are clinically relevant to PEG outcomes. A multivariable logistic regression model estimated adjusted odds ratios (ORs) with 95% confidence intervals (CIs) for any PEG-related complication. Age was modeled per 10-year increase, CRP per 10 mg/L increase, and albumin per 1 g/dL increase. The same baseline covariates were evaluated in the Cox model to facilitate interpretation across outcomes. No post hoc stepwise variable selection was performed.

For one-year survival, Kaplan–Meier methods were used with PEG placement as time zero and all-cause death as the event. Survival distributions were summarized at 365 days. A multivariable Cox proportional hazards model estimated hazard ratios (HRs) with 95% CIs. Schoenfeld residual-based diagnostics were additionally used to assess the proportional hazards assumption. In the available dataset, the residual time-trend assessment showed no evidence of nonproportionality for age (P=.223) or CRP (P=.948), whereas potential nonproportionality was observed for female sex (P=.022) and albumin (P=.004). Because death times were recorded in whole months, these diagnostic results were interpreted cautiously in the presence of tied event times.

The cohort consisted of all consecutive eligible patients during the study period; therefore, no a priori sample-size calculation was performed. The number of outcome events provided 76 complication events for the logistic model and 63 one-year deaths for the Cox model, permitting a deliberately limited four-covariate model and reducing the risk of overfitting compared with a model containing a large number of comorbidities. All tests were two-sided, and P<.05 was considered statistically significant. Analyses were performed using appropriate statistical methods in IBM SPSS Statistics version 26.0. Linearity of the continuous covariates was assessed by comparing the prespecified linear specification with restricted cubic spline specifications. In the logistic regression model, evidence of nonlinearity was observed for albumin (likelihood-ratio P=.016), whereas age (P=.171) and CRP (P=.201) showed no evidence of nonlinearity. In the Cox model, age showed evidence of nonlinearity (P=.007), while CRP (P=.587) and albumin (P=.065) did not.

Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Because of the retrospective nature of the study, individual informed consent was obtained in accordance with the decision of the institutional ethics committee. Patients were not selected according to outcome status. The requirement for individual informed consent was waived by the institutional ethics committee because of the retrospective nature of the study. The study protocol was reviewed and approved by the Ethics Committee of Mersin City Training and Research Hospital (approval number: 2026/353).

Results

In the prespecified Cox proportional hazards model restricted to patients with evaluable survival time, none of the four baseline covariates was independently associated with one-year mortality. The HRs were 0.923 (95% CI 0.787–1.083; P=.326) for age per 10-year increase, 0.930 (95% CI 0.560–1.544; P=.779) for female sex, 1.037 (95% CI 0.998–1.077; P=.061) for CRP per 10 mg/L increase, and 1.061 (95% CI 0.950–1.184; P=.295) for albumin per 1 g/dL increase.

Mortality and one-year survival. During available follow-up, 75 patients (27.2%) died. Among the 67 patients with a documented death date, 63 deaths occurred within 12 months. Eight deaths had no reliable death-date information and were therefore excluded from time-to-event analysis. The estimated one-year overall survival rate was 76.4%. In unadjusted comparisons, patients who died had higher CRP (median, 66.0 vs 51.0 mg/L; P=.040) and were younger (median age, 75 vs 78 years; P=.032). Albumin was lower among patients who died (median, 2.88 vs 3.01 g/dL), but this difference was not statistically significant (P=.065).

In the prespecified multivariable logistic regression model, each 10-year increase in age was associated with lower odds of a documented PEG-related complication (OR 0.758, 95% CI 0.634–0.908; P=.003). Female sex was not independently associated with complications (OR 1.701, 95% CI 0.972–2.975; P=.063), nor were CRP (OR 0.999 per 10 mg/L, 95% CI 0.952–1.048; P=.962) or albumin (OR 1.010 per 1 g/dL, 95% CI 0.850–1.199; P=.913).

PEG-related complications. PEG-related complications were documented in 76 of 276 patients (27.5%). The most frequent events were PEG-site discharge (20/76, 26.3%), tube dislodgement (19/76, 25.0%), tube obstruction (11/76, 14.5%), PEG-site bleeding (9/76, 11.8%), and tube migration (8/76, 10.5%). In unadjusted analysis, patients with complications were younger than

those without complications (median age, 72.5 vs 78.0 years; P=.027), and albumin differed modestly between groups (median, 3.04 vs 2.93 g/dL; P=.017).

Patient characteristics. A total of 276 patients were included. Mean age was 74.3 ± 14.9 years; 142 patients (51.4%) were female; mean CRP was 70.0 ± 58.3 mg/L; and mean albumin was 3.10 ± 1.49 g/dL. Median available follow-up was 23.5 months (IQR, 9–35). The raw dataset contained complete values for age, sex, CRP, albumin, complication status, and follow-up status for all 276 patients; the Cox time-to-event analysis included 268 patients because 8 patients had documented death without a reliable death-time value. Among the 268 evaluable patients, 63 deaths occurred within 12 months.

Table 1. Baseline demographic and clinical characteristics.

Variable	Overall (n=276)
Age, y, mean ± SD	74.3 ± 14.9
Female sex, n (%)	142 (51.4)
Male sex, n (%)	134 (48.6)
CRP, mg/L, mean ± SD	70.0 ± 58.3
Albumin, g/dL, mean ± SD	3.10 ± 1.49
Follow-up, mo, median (IQR)	23.5 (9–35)
PEG-related complication, n (%)	76 (27.5)
Death during available follow-up, n (%)	75 (27.2)
Cerebrovascular disease, n (%)	190 (68.8)
Intracranial hemorrhage, n (%)	40 (14.5)
Dementia, n (%)	20 (7.2)
Intracranial tumor, n (%)	6 (2.2)
Cerebral palsy, n (%)	5 (1.8)
Epilepsy, n (%)	3 (1.1)

Amyotrophic lateral sclerosis, n (%)	3 (1.1)
Myasthenia gravis, n (%)	2 (0.7)
Other neurological/medical conditions, n (%)	7 (2.5)
Hypertension, n (%)	204 (73.9)
Diabetes mellitus, n (%)	114 (41.3)
Coronary artery disease, n (%)	65 (23.6)
Atrial fibrillation, n (%)	34 (12.3)
Dementia as comorbidity, n (%)	59 (21.4)
Epilepsy as comorbidity, n (%)	24 (8.7)
Amyotrophic lateral sclerosis as comorbidity, n (%)	8 (2.9)
Chronic kidney disease, n (%)	6 (2.2)
Malignancy, n (%)	4 (1.4)

Note. PEG indication categories are mutually exclusive and based on the primary diagnosis. Comorbidities are not mutually exclusive; percentages are calculated using the total cohort.

Table 2. Unadjusted comparisons according to PEG-related complications and one-year mortality.

Variable	**Complication (n=76)**	**No complication (n=200)**	**Death during available follow-up (n=75)**	**No death during available follow-up (n=201)**
Age, median (IQR), y	72.5 (60–84.3)	78.0 (71–85)	75 (65–82)	78 (70–86)
CRP, median (IQR), mg/L	52.3 (20.0–98.3)	58.0 (25.1–104.0)	66.0 (30.7–111.5)	51.0 (20.7–95.2)
Albumin, median (IQR), g/dL	3.04 (2.81–3.45)	2.93 (2.58–3.30)	2.88 (2.58–3.22)	3.01 (2.68–3.41)
Female sex, n (%)	44 (57.9)	98 (49.0)	37 (49.3)	105 (52.2)

Note. P values for the complication comparison were .027 for age, .309 for CRP, .017 for albumin, and .236 for female sex. P values for the mortality comparison were .032 for age, .040 for CRP, .065 for albumin, and .769 for female sex. Mortality-group medians and IQRs and sex counts

were calculated from the available patient-level dataset. For mortality, age, CRP, and albumin are presented as median (IQR), and female sex as n (%). Percentages are calculated within the corresponding outcome group.

Table 3. Multivariable models for PEG-related complications and one-year mortality.

Model / Variable	Effect estimate	95% CI	P value
Panel A. Multivariable logistic regression for PEG-related complications			
Age (per 10-y increase)	OR 0.758	0.634–0.908	.003
Female sex	OR 1.701	0.972–2.975	.063
CRP (per 10 mg/L increase)	OR 0.999	0.952–1.048	.962
Albumin (per 1 g/dL increase)	OR 1.010	0.850–1.199	.913
Panel B. Multivariable Cox regression for one-year mortality			
Age (per 10-y increase)	HR 0.923	0.787–1.083	.326
Female sex	HR 0.930	0.560–1.544	.779
CRP (per 10 mg/L increase)	HR 1.037	0.998–1.077	.061
Albumin (per 1 g/dL increase)	HR 1.061	0.950–1.184	.295

Note. Both models were prespecified and adjusted for age, sex, CRP, and albumin. OR, odds ratio; HR, hazard ratio; CI, confidence interval; CRP, C-reactive protein. Estimates were recalculated from the uploaded patient-level dataset. Model-diagnostic results are reported in the Statistical Analysis and Results sections; the Cox estimates should be interpreted with caution because potential nonproportionality was identified for sex and albumin, and potential nonlinearity was

identified for age. The Cox model included 268 patients with evaluable time-to-event data and 63 deaths within 365 days.

Discussion

Overall, the present data support a cautious interpretation of PEG outcomes in neurological patients. More than one-quarter experienced a documented PEG-related complication, while approximately three-quarters remained alive at one year. Age was associated with lower odds of documented complications, but no baseline variable independently predicted one-year mortality in the adjusted Cox model. Prospective multicenter studies incorporating standardized nutritional assessment, neurological severity, functional status, and time-stamped complication data are warranted to develop clinically useful prediction models.

Several limitations should be acknowledged. The retrospective single-center design introduces selection and information bias. The neurological cohort was heterogeneous, and standardized measures of neurological severity, functional status, body-weight trajectory, BMI, formal nutritional risk, dysphagia severity, and care setting were not consistently available. Laboratory values were obtained during routine care rather than according to a standardized research protocol. Eight deaths lacked a reliable death date and were excluded from the time-to-event analysis, although they remained included in the overall mortality count. Complications were assessed during available follow-up, which was longer than the 365-day survival window; this was intentional but creates different observation periods. Exact complication dates were not sufficiently standardized for a robust time-dependent analysis. Finally, the four-covariate models were intentionally limited and therefore cannot exclude residual confounding from comorbidities, neurological diagnosis, or other clinical factors. In addition, model-diagnostic analyses suggested departures from the proportional hazards assumption for sex and albumin and nonlinearity for age in the Cox model. These findings indicate that the reported Cox coefficients should be considered exploratory and confirmed in larger cohorts with more precise event-time data.

This study has several strengths. It included 276 consecutive patients with neurological disorders over a long study period and evaluated both real-world PEG complications and one-year survival. The survival endpoint was analyzed using time-to-event methodology, and the multivariable models were deliberately parsimonious given the number of outcome events. Importantly, the analysis avoided treating post-PEG complications as baseline exposures in the survival model. The present

reanalysis also used the underlying patient-level dataset rather than relying on previously reported regression coefficients.

The predominance of tube- and stoma-related complications also highlights the importance of post-placement surveillance. Dislodgement, obstruction, leakage, and local discharge may interrupt enteral feeding and require tube replacement or additional clinical interventions. Recent systematic-review evidence indicates that unplanned tube replacement and late complications remain relevant in long-term gastrostomy care [28]. Structured tube-care education, prompt recognition of local problems, and appropriate follow-up may therefore be clinically important even when the initial PEG procedure is uncomplicated.

The clinical implication is that PEG decision-making in neurological patients should remain individualized. PEG provides durable enteral access but does not modify the underlying neurological disease. Current guidance emphasizes assessment of the indication, expected benefit, contraindications, nutritional requirements, and the patient's overall clinical trajectory [19,25,26]. In patients with persistent dysphagia, the decision should therefore integrate neurological prognosis, functional status, comorbidity burden, anticipated duration of enteral feeding, and goals of care rather than rely on a single biomarker.

CRP was higher among patients who died in the unadjusted analysis but was not independently associated with mortality in the Cox model. This pattern suggests overlap between inflammation and other measures of disease severity. Similarly, the lower median albumin observed among patients who died did not translate into an independent Cox association. These findings contrast with some previous cohorts in which albumin or composite inflammatory-nutritional indices were associated with mortality after PEG [17,32–35]. Differences in patient selection, disease spectrum, laboratory timing, follow-up, and covariate adjustment may account for the discrepant findings. Our results therefore argue for external validation rather than for using albumin or CRP as stand-alone mortality predictors.

One-year survival was 76.4%, with 63 deaths occurring within 12 months among patients with a documented death date. The observed survival is consistent with the substantial mortality reported in neurological PEG populations, in which outcomes are largely determined by the underlying neurological disorder, frailty, comorbidity burden, and baseline physiological status [13,16–18,22–24]. Importantly, the present study did not identify an independent baseline predictor of one-year mortality among age, sex, CRP, and albumin. The absence of statistical significance should not be

interpreted as evidence that these variables have no prognostic value in general; rather, their independent effects were not demonstrated after simultaneous adjustment in this cohort.

Albumin deserves particular comment because the raw comparison suggested a small difference between complication groups, but albumin was not independently associated with complications after adjustment (OR 1.010, P=.913). This distinction is important. The current analysis therefore provides no evidence that baseline albumin independently predicts PEG-related complications in this cohort. Albumin should be interpreted as a marker influenced by nutrition, inflammation, fluid balance, hepatic function, and systemic disease rather than as an isolated nutritional measurement. Contemporary enteral-nutrition guidance supports broader nutritional and clinical assessment rather than reliance on albumin alone [25,26].

The inverse association between age and documented complications was the only independent finding in the logistic model. Each 10-year increase in age was associated with approximately 24% lower odds of a documented complication. This result should be interpreted cautiously. Age may be acting as a surrogate for unmeasured factors such as mobility, tube manipulation, duration of tube dependence, care environment, survival time, or clinical selection. Younger patients with chronic neurological disorders may remain under active care for longer periods and may undergo more tube manipulation or replacement, increasing the opportunity for a complication to be documented. Conversely, older patients may have shorter survival or different patterns of follow-up. Because the present dataset did not include standardized functional status, care setting, or tube-manipulation frequency, a causal explanation cannot be established.

We intentionally assessed complications across the available follow-up rather than restricting them to an arbitrary early window. This approach was selected to capture clinically relevant late tube- and stoma-related events that may occur during long-term enteral nutrition. However, the complication endpoint and the one-year mortality endpoint consequently have different observation windows. We therefore did not use complication status as a baseline covariate in the Cox model. A complication can occur only after PEG placement and after a patient remains alive long enough for the event to occur; treating such an event as a fixed baseline exposure could introduce immortal-time or other temporal bias. Because exact dates of complications were not sufficiently standardized in the source dataset, a time-dependent analysis was not considered reliable for this retrospective study.

The observed complication rate is within the broad range reported in PEG cohorts, although direct comparison is limited by differences in definitions, patient selection, and follow-up. In our cohort, the most common events involved the tube or stoma, particularly discharge, dislodgement, obstruction, bleeding, and migration. These events are consistent with the established profile of gastrostomy-related morbidity and with recent evidence showing that tube replacement and late tube-related events remain important components of the overall complication burden [6,7,28].

In this retrospective cohort of 276 adults with neurological disorders undergoing PEG placement, PEG-related complications occurred in 27.5% of patients, and the estimated one-year overall survival was 76.4%. The principal findings were that age was independently associated with the occurrence of a documented PEG-related complication, whereas sex, CRP, and albumin were not independent predictors of complications. For one-year mortality, none of the four prespecified baseline variables was independently associated with outcome. These findings underscore the clinical heterogeneity of neurological patients receiving PEG and caution against interpreting a single laboratory value as a sufficient prognostic marker.

Conclusion

In this retrospective cohort of 276 patients with neurological disorders undergoing PEG placement, PEG-related complications occurred in 27.5% of patients, and the estimated one-year overall survival was 76.4%. Increasing age was independently associated with a lower likelihood of documented PEG-related complications, whereas sex, CRP, and albumin were not independent complication predictors. None of the prespecified baseline variables independently predicted one-year mortality in the Cox model. These findings support individualized clinical assessment and highlight the need for prospective, multicenter models incorporating standardized nutritional, functional, neurological, and time-dependent complication data.

Figure legend

Figure 1. Kaplan–Meier curve for one-year overall survival after PEG placement. Among 268 patients with evaluable time-to-event data, 63 deaths occurred within 12 months; the estimated one-year overall survival was 76.4%.

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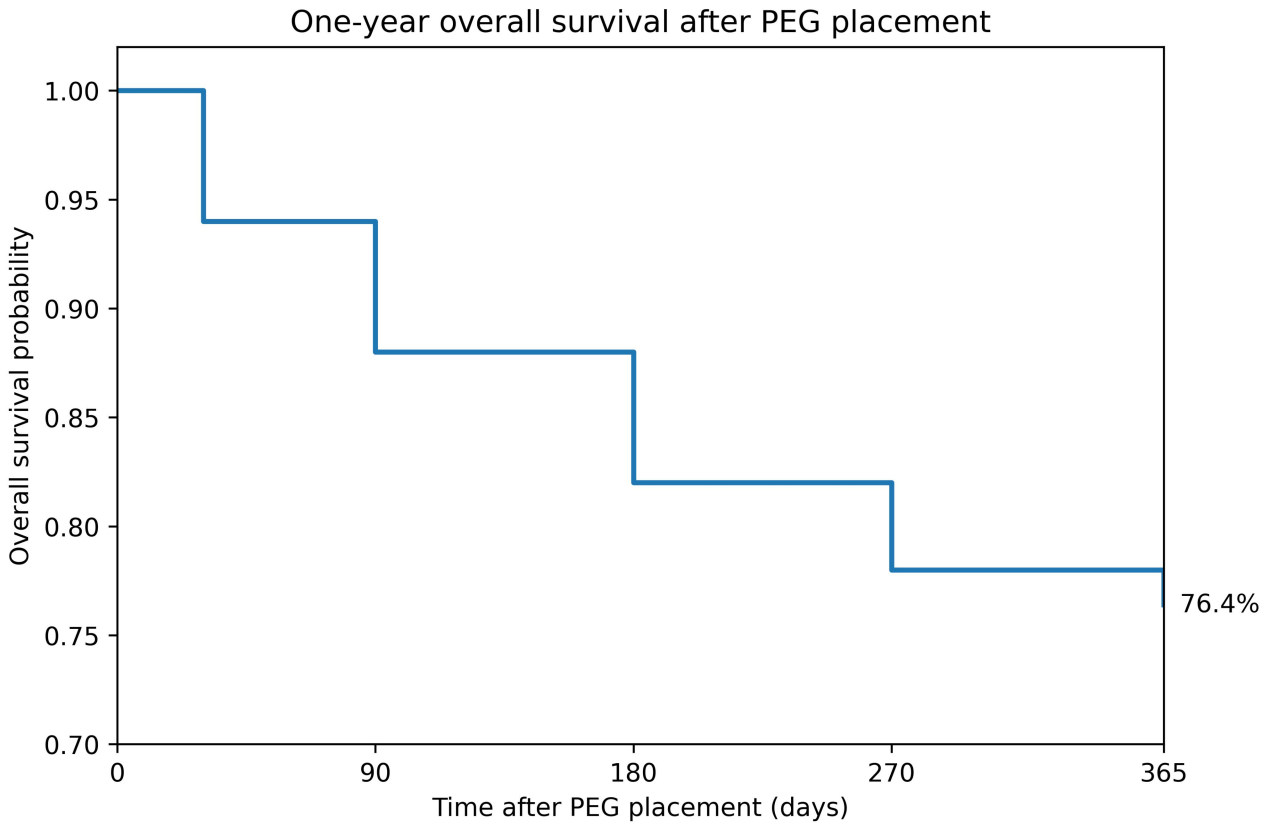


Figure 1. Kaplan–Meier curve for one-year overall survival after PEG placement. Among 268 patients with evaluable time-to-event data, 63 deaths occurred within 12 months; estimated one-year overall survival was 76.4%.