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Comparison Between Geriatric and Non-geriatric Patients in the Development of Complications After Percutaneous Endoscopic Gastrostomy

Cem Azılı[1], Harun Karabacak[2], Şener Balas[2], Muhammed Apaydın[2], Selim Tamam[1], Serdar Çulcu[1], Ahmet Oğuz Hasdemir[2]

[1]Ankara University Faculty of Medicine, Department of General Surgery, Division of Surgical Oncology, Ankara, Turkey
[2]Ankara Etlik City Hospital, Clinic of General Surgery, Ankara, Turkey

Abstract

Objective: Despite the rising geriatric age and the need for percutaneous endoscopic gastrostomy, there are few data regarding its complications and mortality rates in geriatric patients.

Materials and Methods: This is a retrospective study of patients over 18 years old who had a percutaneous endoscopic gastrostomy tube inserted between January 2016 and December 2020. Age, gender, percutaneous endoscopic gastrostomy indications, minor and major post-procedure complications, and 30-day mortality rates were compared between geriatric and non-geriatric patients.

Results: Females accounted for 276 (47.6%) of the 580 patients, while 304 (52.4%) were males. Among the study population, 65.7% of the patients were older patients (n=381), and the median age was 67.8 years. Alzheimer's dementia accompanying dysphagia (n=232; 40%) and stroke (n=148; 25%) were the most prevalent diagnoses. No differences were found regarding the complication rate between geriatric patients and non-geriatric patients. The incidence of complications after percutaneous endoscopic gastrostomy insertion was 35.8%, with 71.1% are minor. Granuloma (12.6%) was the most minor complication while buried bumper syndrome (4.8%) was the most common major complication. However, peristomal leakage-necrotizing fasciitis and aspiration pneumonia was the most lethal complications. The mortality rate was 0.5%, and there was no significant difference between geriatric patients and non-geriatric patients.

Conclusion: We established that older age alone was not a risk factor for geriatric patients undergoing percutaneous endoscopic gastrostomy because there was no statistically significant difference between the complication and mortality rates of younger and older individuals. Hence, PEG can be used safely on older patients when necessary.

Keywords: Alzheimer's disease, geriatric care management, geriatrics, percutaneous endoscopic gastrostomy

Introduction

The term older person is generally defined as someone aged 65 years or older, whereas the term geriatric patient often implies a high degree of frailty and associated pathologies rather than age. Geriatric patients cannot be described by age alone but will be associated with the typical morbidity observed in older patients. Nutritional disorders are becoming an increasingly serious problem in geriatrics as a result of impaired oral intake and comorbidities (1). Enteral nutrition has many advantages over parenteral nutrition in patients who require nutritional support, including lower costs, reduced bacterial translocation, and a lower risk of sepsis. As a result, enteral nutrition is the preferred method when the gastrointestinal tract is functional. Enteral nutrition is possible with a gastrostomy tube, which can be placed surgically or radiologically in patients whose oral intake is insufficient. Percutaneous endoscopic gastrostomy (PEG) is recommended for patients with normal gastrointestinal

Address for Correspondence: Cem Azılı, Ankara University Faculty of Medicine, Department of General Surgery, Division of Surgical Oncology, Ankara, Turkey
Phone: +90 505 314 01 14 **E-mail:** drcemazili@yahoo.com **ORCID:** orcid.org/0000-0003-3661-2052
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system function who will not be fed orally for more than three weeks (2,3).

PEG, which was initially designed for children, is now used in all age groups for various indications (4). Head and neck traumas, various chronic neurological diseases such as Parkinson's disease and dementia, and upper esophageal and pharyngeal cancers are the most common indications (5,6). Weight loss and malnutrition can be avoided with PEG, but complications such as PEG site infection, aspiration pneumonia, gastric perforation, and necrotizing fasciitis may occur after the procedure (7,8).

The elevated incidence of concomitant diseases in older patients requiring PEG, such as cerebrovascular accidents, malignancy, and neurodegenerative disorders, may be a risk factor for the development of complications (9). In this study, we aimed to assess the safety of PEG insertion in geriatric patients by comparing them with non-geriatric patients and to evaluate procedure-related complications. To the best of our knowledge, no study has compared the complication rate due to PEG insertion between the geriatric and non-geriatric populations.

Materials and Methods

This is a retrospective study that included PEG insertions in patients over the age of 18 years performed by a single surgeon between January 2016 and December 2020. The Ethics Committee of clinical research at University of Health Sciences Turkey, Dışkapı Yıldırım Beyazıt Training and Research Hospital granted ethical approval (date: 12.09.2022, no: 146/04). The study excluded patients younger than 18 years of age and 117 cases in which the PEG tube was being replaced. The term "geriatric" patient was used for older people above 65 years and generally having additional comorbidities. We used the "pull" method for inserting the PEG tubes introduced by Gauderer et al. (4). After being given verbal information about PEG insertion, patients or their representatives were routinely asked to provide written consent. The patients' oral intake was stopped at least eight hours before the procedure. Intravenous midazolam was administered to all patients for sedation during the procedure. Oxygen saturation, pulse rate, and blood pressure were monitored during PEG insertion. Patients who were taking antiaggregant drugs had been instructed to stop taking them five days before the intervention. Antiaggregant medications were reinstated 1-2 days after the procedure. A note was recorded for patients who received a single dose of intravenous cefazolin as antimicrobial prophylaxis (AMP) prior to PEG insertion. Considering the patient's clinical status and the existence of comorbidities, the decision to administer AMP was made. All inpatients with coexisting diseases received AMP. Lidocaine hydrochloride spray and prilocaine were used for local oropharyngeal and skin incision anesthesia. Povidone-iodine was used to provide skin antisepsis. All PEG insertions were performed by a single experienced general surgeon. The PEG tube was used to initiate progressive advancement of enteral feedings beginning 24 hours after the procedure.

Complications that occurred within the first 30 days after PEG insertion was evaluated and classified as minor or major complications. Minor complications included granuloma, PEG tube obstruction, local wound infections, and PEG tube dislodgement. Major complications included buried bumper syndrome, aspiration pneumonia, peristomal leakage, gastric bleeding, gastrocolic fistula, intestinal injury, and necrotizing fasciitis. Age, gender, indications for PEG insertion, post procedure complications, and 30-day mortality rates were analyzed.

Statistics

For quantitative variables, mean, standard deviation, and median (minimum-maximum) were used as descriptors, and for qualitative variables, the number of patients (percentage) was used. For categorical variables, numbers and percentages were used. The Kolmogorov-Smirnov test was used to examine the normal distribution of numerical variables. The Mann-Whitney U test or Student's t-test were used to compare two independent groups. The chi-square test was used to compare differences between categorical variables. The Statistical Package for the Social Sciences (SPSS) for Windows version 22.0 was used for all analyses. A p-value of 0.05 was considered statistically significant.

Results

Five hundred and eighty patients had PEG insertions between January 2016 and December 2020. There were 276 female patients (47.6%) and 304 male patients (52.4%). The cohort was divided into geriatric and non-geriatric patients. The geriatric age group included 381 patients (65.7%). The average age of patients was 67.8±19.1 years. Table 1 presents the demographic characteristics and mean age distributions according to indications, complications and mortality rates. The most common reasons for PEG were Alzheimer's dementia accompanying dysphagia (n=232, 40%), cerebrovascular accidents (n=148, 25.5%), and head trauma (n=74, 12.8%). The mean age of patients with Alzheimer's dementia who required PEG implantation, the majority of the geriatric group, was found to be 83.1 years. The mean age of the other comorbidities was found 70.1 years for Parkinson's disease and 68.3 years for cerebrovascular accidents.

The complication rate did not differ by age (p=0.87). The average age of patients who had complications was 65.9 years while the average age of patients who did not have complications was 68.9 years (Table 2). A total of 372 (64.2%) patients had no complications after PEG insertion, while 208 had complications,

Table 1. The demographic characteristics, complication and mortality rate and, the mean age distribution for the various indications for PEG insertion

			Number, %
Number of participants	Geriatric patients		381 (65.7%)
	Non-geriatric patients		199 (34.3%)
Sex	Female		276 (47.6%)
	Male		304 (52.4%)
Mean age (years)	67.8±19.1		
Average age based on indications for PEG insertion (years)	Alzheimer's dementia	83.1±6.8	232 (40%)
	Cerebrovascular accidents	68.3±8.1	148 (25.5%)
	Head trauma	35.5±11.1	74 (12.8%)
	Parkinson's disease	70.1±8.2	52 (9%)
	Cerebral hemorrhage	59.9±9.6	22 (3.7%)
	Cancer	50.6±5.8	16 (2.8%)
	Cerebral palsy	24.2±18.1	14 (2.4%)
	Sepsis	62.3±9.7	12 (2.1%)
	ALS	47.3±9.5	10 (1.7%)
Complications	**None**		**372 (64.2%)**
	Present		208 (35.8%)
	Minor		**148 (25.5%)**
		Granuloma	73 (12.6%)
		Obstruction of PEG tube	46 (7.9%)
		Local wound infections	28 (4.8%)
		Dislodgement of PEG tube	1 (0.2%)
	Major		**60 (10.3%)**
		Buried bumper syndrome	28 (4.8%)
		Aspiration pneumonia	13 (2.2%)
		Peristomal leakage	10 (1.8%)
		Gastric bleeding	6 (1%)
		Gastrocolic fistula	2 (0.3%)
		Intestinal injury	1 (0.2%)
Mortality rate	**Total**		**3 (0.5%)**
	Etiologies	Peristomal leakage-necrotizing fasciitis	**2** (0.3%) 1 (geriatric) 1 (non-geriatric)
		Aspiration pneumonia	1 (0.2%) geriatric

PEG: Percutaneous endoscopic gastrostomy, ALS: Amyotrophic lateral sclerosis

Table 2. Comparison of complication rates after PEG insertion based on age distributions

		Number	Mean age (years)	p
Complications	**None**	372 (64.2%)	68.9±18.3	**0.87**
	Present	208 (35.8%)	65.9±20.4	
	Total	580	67.8±19.1	

Mann-Whitney U test, PEG: Percutaneous endoscopic gastrostomy

indicating a complication rate of 35.8%. Fortunately, 71.1% (148/208) of all complications were classified as minor (n=148, 25.5%). Granulomas (12.6%), PEG obstructions (7.9%), and local wound tube infections (4.8%) were the most common minor complications. Major complications were observed in 60 patients (10.3%) including buried bumper syndrome (4.8%), aspiration pneumonia (2.2%), and peristomal leakage (1.8%). The complication rates in patients with amyotrophic lateral sclerosis (ALS), cerebral palsy, and brain tumors were significantly higher (p=0.001), whereas there were no complications in patients with laryngeal cancers. Table 3 shows the relationship between complication rates and PEG indications. AMP was administered to 264 patients (45.5%), primarily inpatients. The complication rate did not differ significantly with the AMP administration (p=0.063).

Table 4 compares geriatric versus non-geriatric PEG patients in terms of complications, and mortality. The mortality rate related to PEG was 0.5% (3/580) and was similar between groups. Necrotizing fasciitis caused by peristomal leakage (n=2; one geriatric patient and one non-geriatric patient) and aspiration pneumonia (n=1; one geriatric patient) were the causes of PEG related mortality.

Discussion

Due to the prevalence of comorbidities and inadequate dietary intake, malnutrition is a common concern among the older people (10,11). PEG can improve the quality of life by providing nutritional support (12). Our research on the complication rates of PEG in geriatric patients indicates that the procedure is safe. The incidence of procedure-related complications was found to be comparable between the geriatric and non-geriatric patient populations. Moreover, there were no statistically significant differences in mortality rates based on age. We believe that age is not a risk factor alone in geriatric patients with PEG insertion. It should be remembered that Alzheimer's disease may be the only pathologic issue in a substantial fraction of geriatric patients, despite their older age and the presence of critical comorbidities.

Although Alzheimer's dementia is the most common reason for PEG insertion among the geriatric population, accompanying dysphagia and stroke have become more prevalent indications in recent years (11,13). Cerebrovascular accidents and head trauma are also common causes of PEG insertion (3,14). The pathology that necessitates the use of a PEG tube varies with age. We found that the demand for PEG grows dramatically at younger ages in illnesses such as cerebrovascular accidents, head trauma,

Table 3. The distribution of complications based on the indications for PEG insertion and the relationship between complication development and the AMP

		No complication	Complication present	
Distribution of complications based on indications	Alzheimer's dementia	161 (69.4%)	71 (30.6%)	0.001
	Cerebrovascular accidents	86 (58.1%)	62 (41.9%)	
	Head trauma	49 (66.2%)	25 (33.8%)	
	Parkinson's disease	34 (65.4%)	18 (34.6%)	
	Cerebral hemorrhage	10 (45.5%)	12 (54.5%)	
	Laryngeal cancer	11 (100%)	0	
	Cerebral palsy	6 (42.9%)	8 (57.1%)	
	Sepsis	11 (91.7%)	1 (8.3%)	
	ALS	3 (30%)	7 (70%)	
	Total	372 (64.2%)	208 (35.8%)	
AMP	Yes	160 (60.6%)	104 (39.4%)	0.063
	No	212 (67.1%)	104 (32.9%)	

PEG: Percutaneous endoscopic gastrostomy, AMP: Antimicrobial prophylaxis, ALS: Amyotrophic lateral sclerosis

Table 4. Comparison between geriatric and non-geriatric PEG in terms of complications, and mortality

		Non-geriatrics n=199 (34.3%)	Geriatrics n=381 (65.7%)	p
Presence of complications	**None**	120 (32.3%)	252 (67.7%)	0.097
	Present	79 (38%)	129 (62.0%)	
Complications type	**Minor**	55 (37.2%)	93 (62.8%)	0.29
	Major	24 (40%)	36 (60%)	
Mortality rate		1 (0.2%)	2 (0.3%)	0.43

PEG: Percutaneous endoscopic gastrostomy

ALS, and cerebral palsy, while Alzheimer's dementia was the most common reason for PEG in geriatric patients.

PEG tube insertion has been considered a relatively safe and effective intervention. However, studies have found that the mortality and complication rates associated with PEG insertion were significantly higher than predicted (15). According to a recent report, 18-38% of PEG patients experienced moderate complications and 2-4% of PEG insertions led to life-threatening complications. Complications can be divided into two categories based on their severity: minor and major complications. The overwhelming majority of complications, such as wound infections and minor bleeding, are considered minor complications. Necrotizing fasciitis and colocutaneous fistulas are rare complications (16). According to some studies, the incidence of complications after the PEG insertion may range from 16% to 70% (17-21). Variations in the rates reported in the scientific literature due to be caused by differences in the patient populations examined. Older people with a history of infection or aspiration pneumonia are more likely to develop complications (6,20). Our frequency and distribution of minor and major complications were comparable to those of other studies. Our rate of complications was 35.8%, of which 71.1% were evaluated as minor. Granulomas, blockage of the PEG tube, and local wound infections were the most frequently occurring minor complications. There was no significant difference in the development of complications between the geriatric and non-geriatric populations. A multicenter study on PEG mortality and complications determined that older patients had a greater risk of major complications, but the geriatric population was not specifically evaluated (16). Despite the fact that comorbidity is more common in the older people, a recent retrospective study found no significant difference in general complication rates between older and young patients, which is consistent with our findings. We agree with Wirth et al. (22) that procedure-related complications are more dangerous risk factors than old age itself.

A study on AMP in PEG patients supports the use of systemic antibiotics and demonstrates that AMP is effective against peristomal infections in PEG insertion. Various antibiotics, including ceftriaxone, cefuroxime, cefazolin, and cefoxitin, have been evaluated in randomized studies evaluating AMP in PEG patients (23,24). In our study, there was no significant relationship between the complication rate and AMP administration. Recent reports also stated that no differences were found regarding major complications and mortality rates in patients who had given AMP prior to PEG insertion (25).

A recent meta-analysis revealed that despite the fact that PEG-fed patients had a significantly better quality of life than nasogastric-fed patients, there was no significant difference in mortality rates between the two groups. Mortality risk exists regardless of whether a PEG tube is inserted in older or young patients (26). Although complications associated with PEG insertion are believed to be rare, the 30-day mortality rate ranges from 3% to 23%, and the overall hospitality mortality rate was reported to be 5% (11,16,26). The fact that our 30-day mortality rate was 0.5%, which is comparable to the lower level of mortality rates reported in the medical literature, is encouraging.

Although necrotizing fasciitis is a rare complication of PEG, severe traction of the PEG tube may increase the risk in patients with comorbid conditions (8,16). Numerous microorganisms contribute to the life-threatening complication of necrotizing fasciitis; effective treatment options include extensive surgical debridement and broad-spectrum antibiotic therapy. The leading cause of death in our studies was necrotizing fasciitis caused by peristomal leakage. It is known that the condition is more prevalent in diabetic patients and those taking corticosteroids or other immunosuppressive drugs. As evidenced by our data, we believe that this life-threatening complication may result from complications encountered during or after the PEG procedure and not from advanced age.

Study Limitations

The most significant limitations of this study are that it is retrospective and unicentric. In addition, we were unable to evaluate all the requested data due to a deficiency of information in the medical records. Prospective studies from multiple institutions are necessary to confirm our findings. However, because some patients are referred daily from aged care homes in numerous institutions, it is difficult to collect prospective data due to the inability to follow up after the procedure. The data which may be directly related to the nutrition status such as albumin, and hemoglobin could be included to discuss the presence of nutritional disorders. But, it was not possible to obtain these data in all patients due to the retrospective nature of the study. Given the paucity of data in the literature on PEG complications in elderly patients and the fact that 580 PEG procedures were performed in our study by a single experienced surgeon, we deem this study to be valuable research.

Conclusion

The PEG procedure is feasible and safe for older patients. However, geriatric patients require careful patient selection. PEG insertion may be complicated by comorbidities and surgical complications related to the patient but we believe that age is not a risk factor alone in geriatric patients for PEG insertion. Prospective research is required to resolve the discrepancies in the literature regarding PEG outcomes in the geriatric population.

Ethics

Ethics Committee Approval: The Ethics Committee of clinical research at University of Health Sciences Turkey, Dışkapı Yıldırım Beyazıt Training and Research Hospital granted ethical approval (date: 12.09.2022, no: 146/04).

Informed Consent: After being given verbal information about PEG insertion, patients or their representatives were routinely asked to provide written consent.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: C.A., Concept: C.A., Ş.B., Design: C.A., H.K., S.T., A.O.H., Data Collection or Processing: C.A., H.K., M.A., Analysis or Interpretation: C.A., Ş.B., M.A., S.Ç., Literature Search: C.A., S.Ç., Writing: C.A., S.T., A.O.H.

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