

Original Article

Percutaneous endoscopic gastrostomy in dysphagia due to cerebrovascular disease. A 10-year experience

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ABSTRACT: Objective. Dysphagia is frequent in stroke patients and is a potential cause of serious complications. In many cases the use of percutaneous endoscopic gastrostomy (PEG) may become necessary. We analyzed a consecutive series of patients who underwent PEG, with the aim of evaluating the causes of dysphagia as well as the outcome.

Patients. We studied 79 patients, 52 (66%) women and 27 (34%) men who underwent PEG in the period from 1996 to 2005. The stroke was hemorrhagic in 7 (9%) and ischemic in 72 (91%) patients. In 49 (62%) patients, the stroke was a first-ever episode; in 30 (38%) it was a recurrence.

Results. We found a predominance of small vessel disease in comparison with large artery atherosclerosis and cardiac embolism. In the large majority (80%) of cases, chronic dysphagia was associated with bi-hemispheric lesions or direct brain stem involvement. The mean interval (\pm SD) between stroke onset and PEG was 21.8 ± 14.3 days. Easily controlled local complications occurred in 20 cases.

Conclusion. In our experience, PEG was shown to be an effective and reliable procedure. Bi-hemispheric lesions (in particular lacunae) or brain stem involvement were the most frequent causes of chronic dysphagia. (*Nutritional Therapy & Metabolism* 2007; 25: 40-3)

KEY WORDS: Stroke, Dysphagia, PEG, Lacunae, Etiology, Prognosis

INTRODUCTION

The occurrence of dysphagia is not rare in stroke patients and is often related to serious, even lethal, complications such as ingestion pneumonia, malnutrition, dehydration, hydroelectrolytic dysequilibrium and respiratory distress (1-4). In the acute phase of stroke, i.v. artificial nutrition or enteral nutrition by nasogastric tube are usually used, but in cases of chronic dysphagia, the use of percutaneous endoscopic gastrostomy (PEG) may become necessary (5).

We analyzed a consecutive series of patients who underwent PEG in the period from 1996 to 2005 with the aim of evaluating the causes of dysphagia as well as the clinical outcome, with particular attention to stroke patients.

PATIENTS AND METHODS

We analyzed all clinical records of patients admitted to our neurological department between 1 January 1996 and 31 December 2005, and we selected all cases who

underwent PEG during the period of in-hospital stay. In our department, patients with swallowing problems were usually evaluated by a logopedist by means of a formal swallowing assessment and, if necessary, by a specialist in otorhinolaryngology with particular competence in dysphagia. We usually propose PEG when we believe that the swallowing difficulty would be irreversible or, at least, lasting several months. The patients with chronic dysphagia received alimentation as a rule by means of nasal tube before PEG.

We found 95 patients, 64 women (67%) and 31 men (33%), with a mean age (\pm SD) of 75.2 ± 14.3 years, and a median age of 78 years (range 31-103 years). Table I shows the main patient characteristics.

Out of these 95 patients, 79 (83%) had been admitted to our department because of acute stroke. The stroke was ischemic in 72 (91%) and hemorrhagic in 7 (9%) cases. In 49 (62%) patients, the stroke was the first-ever cerebrovascular episode, while in the other 30 cases (38%) the stroke was a recurrence.

Other diseases causing severe dysphagia and need of PEG were observed in 16 (17%) patients: amyotrophic lateral sclerosis in 7, multiple sclerosis in 3, Alzheimer's

TABLE I - NEUROLOGICAL PATIENTS WHO UNDERWENT PEG DURING THE PERIOD 1 JANUARY 1996 TO 31 DECEMBER 2005

Patients	N	%	Mean age \pm SD	Median age (range)
Total number	95	100	75.17 \pm 14.33	78 (32-103)
Males	31	33	71.74 \pm 13.46	74 (38-100)
Females	64	67	76.83 \pm 14.54	81 (32-103)
Stroke cases	79	83	78.37 \pm 12.02	80 (46-103)
Other diseases	16	17	59.38 \pm 14.65	59 (32-69)

TABLE II - STROKE PATIENTS WHO UNDERWENT PEG

Stroke patients	N	%	Mean age \pm SD	Median age (range)
Total	79	100	78.37 \pm 12.02	81(46-103)
Males	27	34	73.00 \pm 12.71	74 (46-100)
Females	52	66	81.15 \pm 10.75	81 (54-103)
Hemorrhagic stroke	7	9	76.57 \pm 14.58	77 (57-90)
Ischemic stroke	72	91	77.90 \pm 12.97	80 (46-103)
First-ever stroke	49	62	80.90 \pm 11.37	81 (46-100)
Recurrent stroke	30	38	76.73 \pm 12.64	78 (54-103)

TABLE III - STROKE CHARACTERISTICS OF PATIENTS WHO UNDERWENT PEG

Hemorrhagic stroke	N	%	Mean age \pm SD	Median age (range)
Total patients	7	100	76.57 \pm 14.58	77 (57-90)
Males	3	43	63.00 \pm 9.54	58 (57-74)
Females	4	57	86.75 \pm 6.50	90 (77-90)
Typical hemorrhage	5	71	71.20 \pm 13.88	74 (57-90)
Lobar hematoma	2	29	90 and 90	-
Ischemic stroke				
Total patients	72	100	77.90 \pm 12.97	80 (46-103)
Males	24	33	74.25 \pm 12.65	76 (46-100)
Females	48	67	80.69 \pm 10.95	82 (54-103)
TOAST classification				
Large vessel atherosclerosis	22	31		
Small vessel occlusion	26	36		
Cardiac embolism	14	19		
ATS + SVO	5	7		
CE + SVO	5	7		
Bamford's classification				
TACI	18	25		
LACI	26	36		
PACI	12	17		
POCI	5	7		
LACI + others	10	14		

ATS = large vessel atherosclerosis

CE = cardiac embolism

LACI = lacunar infarct

PACI= partial anterior circulation infarct

POCI= posterior circulation infarct

SVO = small vessel occlusion

TACI = total anterior circulation infarct

disease in 2 cases and encephalitis, Parkinson's disease, progressive supranuclear palsy and frontobasal degeneration, in 1 case each.

The same surgeon (D.L.) performed all procedures under local anesthesia. For statistical analysis, we used the chi-square test with the Yates correction for frequency comparisons and Student's *t*-test for mean comparisons.

We used the TOAST etiological classification (6), which divides patients with ischemic stroke due to (a) large vessel atherosclerosis, (b) cardiac embolism, (c) small vessel occlusion or (d) other causes or unclassifiable stroke. We also used the classification proposed by Bamford and coworkers (7), based on the vascular territories involved in the cerebral infarcts: (a) TACI = total anterior circulation infarct; (b) PACI = partial anterior circulation infarct; (c) POCI = posterior circulation infarct; and (d) LACI = lacunar infarct.

RESULTS

We found, out of the total number of 12,545 neurological patients admitted to our department in the study period (1996-2005), 95 subjects who underwent PEG (0.76%). Out of these 95, 79 (83%) had suffered a stroke, including 52 (66%) women and 27 (34%) men. The total number of stroke patients was 2,524. The frequency of PEG was significantly higher in this subgroup in comparison with the total patient population (3.1% vs. 0.76%, odds ratio [OR] = 4.1; 95% confidence interval [95% CI], 3.0-5.6; $p < 0.00001$). The mean age of the cerebrovascular disease (CVD) subgroup was 78.2 ± 12.0 years, much older than the patient with other diseases (59.38 ± 14.65 years; $p < 0.001$). Table II shows the main characteristics of stroke patients. A large prevalence of old women was observed in the PEG stroke patient group (66% women, with mean age 81.2 ± 10.8 years vs. 34% men with mean age 73.0 ± 12.7 years; $p < 0.0001$). The etiological classification of ischemic PEG stroke patients ($n=72$) showed a predominance of lacunar infarction due to intracranial small vessel disease (36%), in comparison with large vessel atherosclerosis (31%) and cardiac embolism (19%). In the remaining cases (14%), different types of ischemic lesions were concomitant in the same patient.

In the other 7 cases the stroke was hemorrhagic (2 cases of lobar hematoma and 5 cases of primary hypertensive cerebral hemorrhage in typical location). The stroke characteristics and classification of our PEG stroke patients based on TOAST criteria (6) and the methodology of Bamford et al (7) are shown in Table

TABLE IV - COMPARISON BETWEEN PEG AND NO-PEG STROKE PATIENTS

	PEG		NO-PEG		TOTAL		P
	N	%	N	%	N	%	
Total	79	100	2,445	100	2,524	100	
Males	27	34	1,185	48	1,212	48	0.02
Females	52	66	1,260	52	1,312	52	
Death rate	13	16	265	11	278	11	NS
Hemorrhagic stroke	7	9	318	13	325	13	NS
Large vessel ATS	22	28	807	33	829	33	NS
Small vessel occlusion	26	33	513	21	539	21	0.03
Cardiac embolism	14	18	489	20	503	20	NS
Other	10	13	318	13	328	13	NS
Mean age \pm SD (years)	78.4 \pm 12.0		73.8 \pm 11.0		74.9 \pm 10.9		0.01
In-hospital stay (days)	33.5 \pm 14.9		13.5 \pm 9.6		14.09 \pm 9.7		0.0001

ATS = large vessel atherosclerosis

NS = not significant

III. The global relative frequency of stroke subtypes in our experience was as follows: (a) hemorrhagic stroke 13%, (b) small vessel occlusion 21%, (c) large vessel atherosclerosis 33%, (d) cardiac embolism 20% and (e) other causes or unclassifiable stroke 13%.

Table IV summarizes the comparison between stroke patients who underwent PEG and all other stroke patients, showing significant differences in age (higher in PEG patients), gender distribution (more women than men) and frequency of small vessel occlusion as cause of stroke (higher in PEG patients).

Finally, in about half of cases, multiple bi-hemispheric lacunae were found. Another common location was the brain stem (8 cases, including 7 infarctions and 1 hemorrhage). In cortical or subcortical infarctions, the presence of bilateral hemispheric lesions was also associated with long-lasting dysphagia (10 cases, 12.7%). In 4 subjects with supratentorial hemorrhage and residual dysphagia, lacunar lesions were found in the other hemisphere. In the large majority (80%) of cases, chronic dysphagia was associated with bi-hemispheric lesions or direct brain stem involvement. The interval between stroke onset and PEG was 21.8 ± 14.3 days, and the total mean in-hospital stay period was 33.5 ± 14.9 days.

We observed a post-PEG in-hospital mortality of 13 cases, but in no case was the death due to PEG. The causes of death were cardiac in 6, bronchopneumonia in 4, stroke recurrence in 2 and membranous colitis in 1 patient.

Local complications occurred in 20 cases (skin infection, exit of gastric content), but in all cases, suitable treatment allowed the complication to be controlled. In 3 cases, patients removed the PEG tube, but it was put back in the correct position within 24 hours. In another 8 cases, we observed diarrhea, vomiting or both. We controlled such complications by changing the nutrition schedule or, sometimes, using prokinetics or moving the catheter tip in the duodenum.

DISCUSSION AND CONCLUSION

In our experience, PEG was shown to be an effective and reliable procedure in expert hands. These findings are in agreement with a recent controlled study (8), but in contrast, in part, with recent data in the literature that suggest a more cautious approach in stroke patients with severe dysphagia (9, 10). In particular, the FOOD trial (10) showed that short-term PEG feeding was associated with a tendency to an increased risk of death or poor outcome. Nevertheless we usually postponed PEG until after the clinical stabilization of the stroke patient (mean interval between stroke onset and PEG 21.8 ± 14.3 days). On the other hand, prolonged feeding by nasogastric tube is associated with a high rate of complications due to aspiration (11).

Bi-hemispheric lesions (in particular lacunae) or direct brain stem involvement were the most frequent causes of chronic dysphagia due to stroke.

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