Oropharyngeal dysphagia in the acute post-stroke phase – is there a role for risk factors?

Original Article

Authors

Ana Rita Rodrigues
Hospital Pedro Hispano, Unidade Local de Saúde de Matosinhos, Portugal

Joana Barreto
Hospital Pedro Hispano, Unidade Local de Saúde de Matosinhos, Portugal

Delfim Duarte
Hospital Pedro Hispano, Unidade Local de Saúde de Matosinhos, Portugal

Nuno Oliveira
Hospital Pedro Hispano, Unidade Local de Saúde de Matosinhos, Portugal

Correspondence:
Ana Rita Rodrigues
anarita.rodrigues.9@hotmail.com

Article received on February 17, 2025.
Accepted for publication on April 24, 2025.

Abstract

Introduction: Stroke is one of the main causes of morbimortality in developed countries. Oropharyngeal dysphagia (OPD) is the second most frequent complication in the acute post-stroke phase and it is an independent predictor of unfavorable outcome and institutionalization, being associated with longer hospital stays and a huge economic impact. There is a documented association between the presence of certain sociodemographic and clinical characteristics and the incidence of post-stroke OPD, namely: advanced age, presence of cognitive impairment, higher degree of dependence, National Institute of Health Stroke Scale (NIHSS) at admission greater than four and brainstem involvement.
Objectives: This study aimed to characterize, from a sociodemographic and clinical point of view, patients in the acute post-stroke phase in a tertiary hospital who underwent functional endoscopic evaluation of swallowing (FEES) due to suspected dysphagia and to correlate the results obtained in FEES suggestive of OPD with each of the variables.
Methods: A retrospective analysis of 68 patients who underwent FEES in the acute post-stroke phase at our hospital from 2018 to 2023 was conducted, with description of their sociodemographic profile, event characteristics and FEES findings.
Results: Regarding sociodemographic characteristics: 73.53% were at least 70 years old, 60.29% were male, 36.76% had some degree of dependence and 13.24% had dementia. When it comes to stroke's features: 83.83% were of ischemic etiology, 80.88% had involvement of the cerebral hemispheres, 16.18% of the brainstem and 7.35% of the cerebellum, and 85.29% had an NIHSS at admission greater than 4. Concerning FEES' findings: 42.65% of patients showed significant salivary stasis, 60.29% had delayed swallowing reflex, 48.53% had residue after swallowing, 10% had vocal chords paralysis and 57.59% had penetration or aspiration, of which 12% were silent aspirations. After a comparative analysis of all sociodemographic and clinical variables with the presence of OPD, a statistically significant relationship was only obtained for the presence of

NIHSS at admission greater than 4 (p=0.015).
Discussion: Although the presence of some of these risk factors may signal an increased risk of OPD in patients in the acute post-stroke phase, it does not replace an instrumental assessment of swallowing. Moreover, FEES has the ability to identify salivary stasis or a delay in the swallowing reflex and to detect silent aspirations. Aspiration pneumonia is the most common complication of OPD in the acute post-stroke phase and is the leading cause of hospital admission and death, with silent aspirations being the main risk factor.
Conclusion: Although the clinical assessment of swallowing plays an important role in the evaluation of oropharyngeal competence, it lacks sensitivity in screening OPD in the acute post-stroke phase, not only in cases of altered state of consciousness, but also in the presence of silent aspirations. In these situations, FEES is a more reliable tool to assess airway protection, with the otolaryngologists playing a primary role in post-stroke patients' evaluation.
Keywords: Stroke; oropharyngeal dysphagia; fiberoptic endoscopic evaluation of swallowing

Introduction

Stroke is one of the leading causes of morbidity and mortality in developed countries and the chief cause of death and disability in Portugal.[1] Otolaryngologists are often involved in the care of patients during the acute phase after a stroke, particularly in the evaluation and characterization of suspected dysphagia. Oropharyngeal dysphagia (OD) is defined as difficulty or inability to transport a food bolus safely and effectively from the oral cavity to the esophagus. This condition is associated with a high incidence of pneumonia, dehydration, and malnutrition, which can lead to prolonged hospital stay.[2–4] The incidence of OD in the acute post-stroke phase ranges between 22–81%,[5,6] and this wide variability is primarily due to the differences in the diagnostic methods. The incidence rates are approximately 37–45% when OD is identified with screening tests, 51–55% with bedside assessments, and 64–78% using instrumental evaluations.[2] However, several other factors may contribute to these discrepant incidence rates, including age ≥ 70 years,[7–9] cognitive impairment or dementia,[7,8] greater degree of disability,[7,10] National Institutes of Health Stroke Scale (NIHSS) score > 4 on admission,[7,9,11,12] malnutrition or low body mass index (BMI),[7,10] larger lesion volume,[7,9,13] hemorrhagic stroke etiology,[7,14,15] and brainstem involvement.[7,11,14,15]

Objectives

This study aimed to characterize the sociodemographic and clinical profiles of patients in the acute phase of stroke who underwent fiberoptic endoscopic evaluation of swallowing (FEES) due to suspected dysphagia at a tertiary hospital. Additionally, the study correlated FEES findings indicative of OD with each of the analyzed variables.

Materials and methods

The clinical records of all individuals who underwent FEES at Hospital Pedro Hispano between January 2018 and December 2023 were retrospectively analyzed. From an initial sample of 237 individuals, 169 were excluded for not meeting the inclusion criteria. Exclusions comprised patients who underwent FEES for reasons other than suspected post-stroke OD (e.g., amyotrophic lateral sclerosis, systemic sclerosis, traumatic brain injury, Parkinson's disease, and presbyphagia), those evaluated during the subacute or chronic phases after stroke, and all duplicate cases. The final sample consisted of 68 patients. All data were collected from the electronic clinical records of patients treated at Hospital Pedro Hispano using the SClínico information system.

Statistical analysis was conducted using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) and IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA).

Statistical significance was defined as $p < 0.05$. The Fisher's exact test was used to evaluate the association between two categorical variables. The Chi-square test was used when both variables were dichotomous and had expected frequencies of five or more.

Results

Regarding the sociodemographic characteristics, 50 individuals (73.53%) were aged ≥ 75 years, 41 (60.29%) were male, nine (13.24%) had

a diagnosis of dementia, and 25 (36.76%) had a degree of dependence ≥ 2 on the modified Rankin scale (mRS), as shown in Table 1.

Regarding the stroke characteristics, six patients (8.82%) had a hemorrhagic etiology and five (7.35%) experienced hemorrhagic transformation after an ischemic event. There was only one case (1.47%) of bilateral involvement, with the remaining cases evenly distributed between the left and right sides. The stroke involved the brainstem in 11 patients (16.18%) and cerebellum in five (7.35%) patients. On admission, 58 patients (85.29%) had an NIHSS score greater than four (Table 2).

For the FEES procedure, three consistencies were tested in accordance with the International Dysphagia Diet Standardisation Initiative (IDDSI)[16]: thin (colored water), slightly thick (level 1), and moderately thick (level 3).

Among all patients, 29 (42.65%) had salivary stasis, 41 (60.29%) showed posterior spillage due to delayed oropharyngeal swallowing reflex, and 33 (48.53%) experienced residue after swallowing. In contrast, only seven patients (10%) exhibited vocal fold paralysis (Table 3). Regarding the degree of OD, 29 patients (42.65%) showed no penetration or aspiration (Penetration-Aspiration Scale [P AS] sores 1–3), while 16 (23.53%) exhibited penetration (PAS 4–5), with half of these cases involving liquids. Aspiration was observed in 23 patients (33.82%), of whom 15 (65.22%)

Table 1
Socioeconomic characteristics

	years, mean (SD)	**75,79 (9,97)**
Age	<70 anos, n= (%)	18 (26,47)
	≥70 anos, n= (%)	50 (73,53)
Male sex, n = (%)		41 (60,29)
Dementia, n = (%)		9 (13,24)
Degree of disability (mRS)	0-1, n= (%)	43 (63,24)
	2-3, n= (%)	20 (29,41)
	≥4, n= (%)	5 (7,35)

mRS, modified Rankin scale; SD, standard deviation

Table 2
Clinical characteristics

Stroke etiology	Ischemic, n = (%)	57 (83,83)
	Hemorrhagic, n = (%)	6 (8,82)
	Hemorrhagic transformation after an ischemic event, n = (%)	5 (7,35)
Laterality	Right, n = (%)	38 (55,88)
	Left, n = (%)	29 (42,65)
	Bilateral, n = (%)	1 (1,47)
Site	Hemispheric, n = (%)	53 (77,94)
	Brainstem, n = (%)	10 (14,71)
	Cerebellum, n = (%)	2 (2,94)
	Hemispheric and cerebellum, n = (%)	2 (2,94)
	Brainstem and cerebellum, n = (%)	1 (1,47)
NIHSS score on admission	≤4, n= (%)	10 (14,71)
	>4, n= (%)	58 (85,29)

NIHSS, National Institutes of Health Stroke Scale

presented with a preserved cough reflex (PAS 6–7). Silent aspirations (PAS 8) occurred in the remaining eight individuals (11.77% of the total sample) (Table 4).A comparative analysis was conducted to investigate the relationship of sociodemographic and clinical variables with the presence of OD. Initially, the degree of OD was used as the primary outcome; however, no statistically significant associations were found with any of the analyzed variables (Table 5). Subsequently, to reduce the variability in the results, a dichotomous outcome was used as the primary outcome: the presence or absence of OD. The variables were re-evaluated, and it was that presence or absence of OD had a statistically significant association only with an NIHSS score greater than four on admission (p = 0.015) (Table 5).

Discussion

Multiple predictors of OD in the acute post-stroke phase have been reported in the literature,[7] with characteristics such as the stroke etiology, site, and severity being considered the most significant factors. A higher prevalence of OD has been found in patients with a hemorrhagic stroke (49.2%) compared to those with an ischemic stroke (32.1%).[14,15] Cases with strokes involving both the brainstem and cerebral hemispheres (85%) also exhibit a higher prevalence of OD, followed by strokes with isolated brainstem involvement (67%) and bilateral hemispheric involvement (56%), with the lowest prevalence in unilateral hemispheric involvement (40%).[14,15] In contrast, our study identified a NIHSS score greater than four on admission as a predictive factor for OD, which may be

Table 3
Fiberoptic Endoscopic Evaluation of Swallowing (FEES) findings

Patient collaboration	Collaborative, n = (%)	51 (75)
	Non-collaborative, n = (%)	17 (25)
Salivary stasis, n = (%)		29 (42,65)
Vocal fold paralysis, n = (%)		7 (10,29)
Delayed oropharyngeal swallowing reflex, n = (%)		41 (60,29)
Residue after swallowing, n = (%)		33 (48,53)

Table 4
Degree of Oropharyngeal Dysphagia (OD)

No penetration or aspiration (PAS 1–3), n = (%), n= (%)		**29 (42,65)**
Penetration (PAS 4-5)	Intermediate consistencies*, n =	8
	Liquids, n =	8
	Saliva, n =	0
	Total, n = (%)	**16 (23,53)**
Aspiration with protective reflex (PAS 6-7)	Intermediate consistencies*, n =	0
	Liquids, n =	15
	Saliva, n =	0
	Total, n = (%)	**15 (22,06)**
Silent aspiration (PAS 8)	Intermediate consistencies*, n =	1
	Liquids, n =	3
	Saliva, n =	4
	Total, n = (%)	**8 (11,77)**

PAS, Penetration-Aspiration Scale; *Levels 1–4 according to the International Dysphagia Diet Standardisation Initiative (IDDSI)[16]

Table 5
Association of variables with the degree of OD

Variables	Degree of OD (p =)	Presence of OD (p=)
Sociodemographic characteristics		
Age (< 70 vs ≥ 70 years)	0.835[a]	0.857[b]
Sex	0.063[a]	0.457[b]
Dementia	0.785[a]	0.481[a]
Degree of disability (mRS)	0.435[a]	0.204[a]
Clinical characteristics		
Stroke etiology	0.437[a]	0.551[a]
Laterality	0.129[a]	0.782[a]
Stroke site	0.703[a]	0.802[a]
NIHSS on admission	0.057[a]	0.015[a]

[a]Fisher's exact test, [b]Chi-square test

partially explained by the small sample size. Although some of the abovementioned characteristics may increase the risk of OD in the acute post-stroke phase, they should not be used in isolation to make decisions regarding oral feeding. Moreover, they cannot replace a more objective assessment, ideally an instrumental test such as FEES. While bedside clinical assessment plays a crucial role in the initial screening of oropharyngeal function in the acute post-stroke phase, it lacks sensitivity, particularly in patients with altered consciousness or silent aspirations. In contrast, FEES enables the detection of silent aspiration and identification of signs such as salivary stasis or delayed oropharyngeal swallowing reflex, as observed in our sample, which are indirect indicators of OD.

Vocal fold paralysis is a rare finding in patients with post-stroke OD and occurs almost exclusively in strokes involving the brainstem, which are less common. Furthermore, it is a poor predictor of OD, limiting the diagnostic value of a simple flexible nasolaryngoscopy.

The consequences of post-stroke OD mirror those seen in other etiologies, such as respiratory infections. Aspiration pneumonia is highly common during the acute post-stroke phase, potentially affecting up to 40% of patients with certain risk factors, especially OD.[17–19] Its incidence can be up to 11-fold higher in cases of confirmed aspiration.[2,21] Nearly half of the patients with OD in the acute post-stroke phase experience aspiration events,[22] similar to our sample, with about half of these events being silent.[6] Additionally, aspiration pneumonia is the leading cause of mortality in this population and primary cause of institutionalization and hospitalization.[20]

OD is also associated with other complications, including malnutrition and dehydration. If not managed appropriately, these conditions can result in sarcopenia, reduced immune function, and delayed wound healing, further exacerbating the socioeconomic impact of stroke.[23]

Conclusions

OD is a major problem in the acute post-stroke phase. Given the limited predictive value of clinical factors, a systematic approach is required for early detection of OD. FEES is a reliable method for assessing airway protection, highlighting the fundamental role of otolaryngology in the evaluation and management of these patients.

Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Data Confidentiality

The authors declare having followed the protocols used at their working center regarding patient data publication.

Protection of humans and animals

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and the 2013 Helsinki Declaration of The World Medical Association.

Funding Sources

This work did not receive any contribution, funding, or scholarship.

Availability of scientific data

There are no datasets available, or publicity related to this work.

References

1. INE. Portal do Instituto Nacional de Estatística [Internet]. Portugal, Lisboa: Instituto Nacional de Estatística; 2024 [cited 2024 July 21]. Available from: https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=646027025&DESTAQUESmodo=2
2. Martino R, Foley N, Bhogal S, Diamant N, Speechley M, Teasell R. Dysphagia after stroke: incidence, diagnosis, and pulmonary complications. Stroke. 2005 Dec;36(12):2756-63. doi: 10.1161/01.STR.0000190056.76543.eb.
3. Clavé P, Shaker R. Dysphagia: current reality and scope of the problem. Nat Rev Gastroenterol Hepatol. 2015 May;12(5):259-70. doi: 10.1038/nrgastro.2015.49.
4. Terré R. Oropharyngeal dysphagia in stroke: diagnostic and therapeutic aspects. Rev Neurol. 2020 Jun 16;70(12):444-452. doi: 10.33588/rn.7012.2019447.
5. Daniels SK, Huckabee ML, Gozdzikowska K. Dysphagia Following Stroke, 3rd ed. San Diego, CA: Plural Publishing; 2019.
6. Terré R, Mearin F. Oropharyngeal dysphagia after the acute phase of stroke: predictors of aspiration. Neurogastroenterol Motil. 2006 Mar;18(3):200-5. doi: 10.1111/j.1365-2982.2005.00729.x.
7. Jones CA, Colletti CM, Ding MC. Post-stroke dysphagia: recent insights and unanswered questions. Curr Neurol Neurosci Rep. 2020 Nov 2;20(12):61. doi: 10.1007/s11910-020-01081-z.
8. Leite KKA, Sassi FC, Medeiros GC, Comerlatti LR, Andrade CRF. Clinical swallowing prognostic indicators in patients with acute ischemic stroke. Arq Neuropsiquiatr. 2019 Jul 29;77(7):501-508. doi: 10.1590/0004-282X20190080.
9. Fernández-Pombo A, Seijo-Raposo IM, López-Osorio N, Cantón-Blanco A, González-Rodríguez M, Arias-Rivas S. et al. Lesion location and other predictive factors of dysphagia and its complications in acute stroke. Clin Nutr ESPEN. 2019 Oct:33:178-182. doi: 10.1016/j.clnesp.2019.05.019.
10. Ortega Barrio MÁ, Valiñas Sieiro F, Almarza Fernández MT, Bravo Santamaria S. Moreno Maestro R. Effect of stroke on nutritional status and its relationship with dysphagia. Rev Científica Soc Enfermería Neurol (English Ed). 2020 Jan-Jun; 51:13–21. doi: 10.1016/j.sedeng.2019.04.003.
11. Beharry A, Michel P, Faouzi M, Kuntzer T, Schweizer V, Diserens K. Predictive factors of swallowing disorders and bronchopneumonia in acute ischemic stroke. J Stroke Cerebrovasc Dis. 2019 Aug;28(8):2148-2154. doi: 10.1016/j.jstrokecerebrovasdis.2019.04.025
12. Fandler S, Gattringer T, Eppinger S, Doppelhofer K, Pinter D, Niederkorn K. et al. Frequency and predictors of dysphagia in patients with recent small subcortical infarcts. Stroke. 2017 Jan;48(1):213-215. doi: 10.1161/STROKEAHA.116.015625.
13. Suntrup S, Kemmling A, Warnecke T, Hamacher C, Oelenberg S, Niederstadt T. et al. The impact of lesion location on dysphagia incidence, pattern and complications in acute stroke. Part 1: dysphagia incidence, severity and aspiration. Eur J Neurol. 2015 May;22(5):832-8. doi: 10.1111/ene.12670.
14. Paciaroni M, Mazzotta G, Corea F, Caso V, Venti M, Milia P. et al. Dysphagia following stroke. Eur Neurol. 2004;51(3):162-7. doi: 10.1159/000077663.
15. Falsetti P, Acciai C, Palilla R, Bosi M, Carpinteri F, Zingarelli A. et al. Oropharyngeal dysphagia after stroke: incidence, diagnosis, and clinical predictors in patients admitted to a neuro-rehabilitation unit. J Stroke Cerebrovasc Dis. 2009 Sep-Oct;18(5):329-35. doi: 10.1016/j.jstrokecerebrovasdis.2009.01.009.
16. IDDSI - International Dysphagia Diet Standardisation Initiative.[Internet] [Accessed 2024 Sept 25] Available from: https://iddsi.org
17. Serra-Prat M, Palomera M, Gomez C, Sar-Shalom D, Saiz A, Montoya JG. et al. Oropharyngeal dysphagia as a risk factor for malnutrition and lower respiratory tract infection in independently living older persons: a population-based prospective study. Age Ageing. 2012 May;41(3):376-81. doi: 10.1093/ageing/afs006.
18. Hoffmann S, Malzahn U, Harms H, Koennecke HC, Berger K, Kalic M. et al. Development of a clinical score (A2DS2) to predict pneumonia in acute ischemic stroke. Stroke. 2012 Oct;43(10):2617-23. doi: 10.1161/STROKEAHA.112.653055.
19. Westendorp WF, Nederkoorn PJ, Vermeij JD, Dijkgraaf MG, van de Beek D. Post-stroke infection: a systematic review and meta-analysis. BMC Neurol. 2011 Sep 20:11:110. doi: 10.1186/1471-2377-11-110.
20. Dziewas R, Allescher HD, Aroyo I, Bartolome G, Beilenhoff U, Bohlender J, et al. Diagnosis and treatment of neurogenic dysphagia. Neurol Res Pract. 2021 May 4;3(1):23. doi: 10.1186/s42466-021-00122-3.
21. Cohen DL, Roffe C, Beavan J, Blackett B, Fairfield CA, Hamdy S. et al. Post-stroke dysphagia: a review and design considerations for future trials. Int J Stroke. 2016 Jun;11(4):399-411. doi: 10.1177/1747493016639057.
22. Mann G, Hankey GJ, Cameron D. Swallowing function after stroke: prognosis and prognostic factors at 6 months. Stroke. 1999 Apr;30(4):744-8. doi: 10.1161/01.str.30.4.744.
23. Ortega O, Martín A, Clavé P. Diagnosis and management of oropharyngeal dysphagia among older persons, state of the art. J Am Med Dir Assoc. 2017 Jul 1;18(7):576-582. doi: 10.1016/j.jamda.2017.02.015.