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Dysphagia and cerebrovascular accident: relationship between severity degree and level of neurological impairment

Disfagia e acidente vascular cerebral: relação entre o grau de severidade e o nível de comprometimento neurológico

ABSTRACT

The aim of this case study was to verify the occurrence of dysphagia in acute ischemic stroke within 48 hours after the onset of the first symptoms, in order to establish a possible relationship between the level of neurologic impairment and the severity degree of dysphagia. After emergency hospital admission, three patients underwent neurological clinical evaluation (general physical examination, neurological examination, and application of the National Institute of Health Stroke Scale – NIHSS), and clinical assessment of swallowing using the *Protocolo Fonoaudiológico de Avaliação do Risco para Disfagia* (PARD – Speech-Language Pathology Protocol for Risk Evaluation for Dysphagia). One of the patients presented functional swallowing (NIHSS score 11), while the other two had mild and moderate oropharyngeal dysphagia (NIHSS scores 15 and 19, respectively). The service flow and the delay on the patients' search for medical care determined the small sample. The findings corroborate literature data regarding the severity of the neurological condition and the manifestation of dysphagia.

RESUMO

O objetivo deste estudo foi verificar a ocorrência de disfagia após acidente vascular cerebral (AVC) isquêmico agudo durante as primeiras 48 horas de aparecimento dos sintomas para o estabelecimento de uma possível relação entre o nível de comprometimento neurológico e o grau de severidade da disfagia. Após a admissão hospitalar de emergência, três pacientes passaram por avaliação clínica neurológica, composta por exame físico geral, exame neurológico e aplicação da *National Institute of Health Stroke Scale* (NIHSS); e avaliação clínica da deglutição por meio do Protocolo Fonoaudiológico de Avaliação do Risco para Disfagia (PARD). Dos pacientes avaliados, um apresentou deglutição funcional, com NIHSS 11, e dois apresentaram disfagia orofaríngea leve e moderada, sendo o NIHSS 15 e 19, respectivamente. O fluxo do serviço e a procura tardia dos pacientes por auxílio médico determinaram o baixo número de amostra. Os resultados obtidos confirmam os dados da literatura em relação à gravidade do paciente neurológico e à manifestação de disfagia.

Study carried out at the emergency department, Irmandade Santa Casa de Misericórdia de Porto Alegre – IS-CMPA – Porto Alegre (RS), Brasil.

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INTRODUCTION

Stroke is the leading cause of severe neurological disability. It's a public health problem because it consists of a major cause of death worldwide, with high costs in treatment. According to World Health Organization, it consists of rapidly developing signs of focal (or global) disturbance of the brain function, lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin⁽¹⁾. Stroke can be the result of an ischemia (80% of cases), which consists of an occlusion of a blood vessel that interrupts blood flow to a particular region in the brain and damages the neurological functions that depend on the affected region; or of an hemorrhage (about 20% of cases)⁽²⁾.

Statistics from the American Heart Association, in 2011, have determined that, when considered separately from other cardiovascular diseases, stroke ranks as the third leading cause of death. Recent studies on incidence and mortality revealed that, on average, someone in the United States has a stroke every 40 seconds; and at every four minutes someone dies of a stroke⁽³⁾.

The cerebral circulation is mainly supplied by two major vascular systems: carotid system, responsible for supplying blood to the anterior three-quarters of the cerebral hemispheres by the anterior and middle cerebral arteries and anterior choroidal artery; and vertebrobasilar system, responsible for the vascularization of the brain stem, cerebellum and posterior portion of the cerebral hemispheres by the posterior cerebral artery^(4,5). The localization of the vascular accident, as well as its extension, have a direct relation to the clinical manifestations and the prognosis⁽⁴⁾.

The clinical manifestations described include severe headaches accompanied by vomiting and dizziness; hemiplegia; hemianopsia; speech and language disorders, such as aphasia, dysarthria and scanning speech; apraxia; postural and gait disorders; motor and sensory disorders, or isolated impairment of cranial nerves. Complications such as pulmonary aspiration and pneumonia, hemiparesis, depression, emotional lability, and dysphagia, are possible consequences of stroke⁽⁶⁾.

Dysphagia is a symptom that consists of difficulty to swallow⁽⁴⁾, and may be considered morbidity when expressed as a result of stroke, depending on the lesion type and the patient's age⁽⁷⁾. Cough, throat clearing, nasal regurgitation, weight loss, residue in the oral cavity, and nasal voice are the most common signs or indications of dysphagia⁽⁴⁾.

The incidence of dysphagia after stroke can vary from 42% to 67%^(7,8) and its presence is associated with an increased risk of pulmonary aspiration, malnutrition, dehydration, longer length of hospital stay, and death^(7,9).

In the first 48 hours after stroke the patient is assessed according to the criteria of the National Institute of Health Stroke Scale (NIHSS): level of consciousness, visual field, facial palsy, motor strength, ataxia, language, dysarthria, and attention. Although this scale can be easily and quickly applied, it does not evaluate swallowing disorders.

The aim of this case study was to verify the occurrence of dysphagia in acute ischemic stroke within 48 hours after the

onset of the first symptoms, in order to establish a possible correlation between the level of neurologic impairment and the severity degree of dysphagia.

CLINICAL CASE PRESENTATION

The research has been approved by the Research Ethics Committee of the Irmandade Santa Casa de Misericórdia de Porto Alegre under process number 3263/10. The participants or their guardians signed the Term of Free and Informed Consent (TFIC) that considered the ethical aspects recommended by resolution 196/96 (BRAZIL. Resolution MS/CNS/CNEP n° 196/96 of October 10th, 1996).

This is a descriptive study of a case series evaluated at the Irmandade Santa Casa de Misericórdia de Porto Alegre from June to September 2010. The sample consisted of three patients, one female and two males, with mean age of 65 years and 6 months. All patients underwent emergency procedures and hospitalization. After discharge, the medical records were reviewed by the researchers to verify the location of the neurologic injury (after its definition in image findings).

After hospital admission, it was carried out a clinical neurological examination, including general physical examination, neurological examination and application of the NIHSS stroke scale. Later, the NIHSS was reapplied during the speech-language pathology assessment, in order to verify the level of consciousness, so that the results could be related to the swallowing data. To analyze the degree of neurological impairment assigned by the NIHSS, the following classification was used: 0-6 for mild stroke; 7-15 for moderate; 16 or more for severe stroke⁽¹⁰⁾.

The research included patients diagnosed with ischemic stroke that arrived to the hospital emergency within 48 hours after the onset of symptoms, and who had stable clinical status at the time of the swallowing assessment. Patients without adequate clinical conditions, who didn't have a definite diagnosis, or who had hemorrhagic stroke were excluded from the sample.

The swallowing evaluation was performed by the speech-language pathologist using the *Protocolo Fonoaudiológico de Avaliação do Risco para Disfagia* (PARD – Dysphagia Risk Evaluation Protocol)⁽¹¹⁾. Patients were told to sit or lay down with their heads elevated 45 degrees. Initially, it was offered the pasty consistency because of the better oral control and the decreased aspiration risk⁽⁸⁾. Due to the policy that all intervention to patients at the hospital emergency are brief, the subjects were assessed gradually only with 5 and 10 ml for pasty consistency (offered in a plastic spoon), and 3 and 5 ml for liquid consistency (offered in a syringe). The verification of the vital signs used a stethoscope and a pulse oximeter.

Case 1

M.P., 74 years old, female, white, arrived at the hospital emergency 10 hours after the onset of the first symptoms of stroke. In a clinical neurological evaluation she showed left hemianopsia and hemiplegia, deviation of labial commissure

to the right and decreased level of consciousness, with NIHSS 15. The computed tomography (CT) scan revealed extensive ischemic damage in the right middle cerebral artery, with lesions in the fronto-temporo-parietal and right basal ganglia. Because of the decreased level of consciousness presented by the patient, additional care was necessary during speech-language pathology evaluation and during the stay at the emergency room.

For the swallowing evaluation, in pasty consistency, she showed poor oral control of the bolus (escape out of mouth) with 10 ml, multiple swallowing with 5 and 10 ml, and post-swallow oral residue with 5 and 10 ml. With liquid consistency, weak cough after swallowing and multiple swallows in 5 ml. The other evaluation criteria remained normal. Therefore, the diagnosis of this patient was mild oropharyngeal dysphagia.

Case 2

R.P., 59 years old, male, white, arrived at the hospital emergency 21 hours after the onset of the first symptoms of stroke. In a clinical neurological evaluation he showed right hemiparesis and communication impairment, with NIHSS 19. CT scan revealed extensive involvement of the left middle cerebral artery territory.

For the swallowing evaluation, it was offered 3 and 5 ml of pasty consistency, instead of the 5 and 10 ml previously determined, because the patient presented a severe stroke, inspiring greater care. With both volumes, there was poor oral control of the bolus (escape out of mouth), slow oral transit time, reduced laryngeal elevation, and positive cervical auscultation before and after swallowing. With liquid, for safety, only 3 ml were offered due to his low performance swallowing pasty consistency. Cervical auscultation was positive before and after feeding, and wet voice with spontaneous clearance was observed. Therefore, the diagnosis of this patient was moderate oropharyngeal dysphagia, with significant aspiration risk. Feeding evolved into the placement of a nasogastric tube.

Case 3

A.S., 64 years old, male, black, arrived at the hospital emergency 47 hours after the onset of the first symptoms of stroke. In the clinical neurological evaluation he showed right hemiparesis, dysarthria and mild bilateral dysmetria, with NIHSS 11. CT scan revealed Posterior Circulation Stroke Syndrome (POCS), confirmed by restricted diffusion on the topography of the right posterior inferior cerebellar artery and cerebellar vermis. Cerebral angiography showed critical stenosis in vertebral arteries: occlusion of the right vertebral artery and severe stenosis in the left vertebrobasilar junction.

In the swallowing evaluation with pasty consistency he presented multiple swallows with 5 ml, and residue in oral cavity with 5 and 10 ml. With 3 and 5 ml of liquid consistency, all evaluation criteria remained appropriate. Thus, the diagnosis of this patient was functional swallowing due to the occurrence of spontaneous compensations (Table 1).

Table 1. Relationship between the results obtained with PARD and NIHSS

Cases	PARD	NIHSS
Case 1	Mild oropharyngeal dysphagia	15
Case 2	Moderate oropharyngeal dysphagia	19
Case 3	Functional swallowing	11

Note: PARD = Protocolo Fonoaudiológico de Avaliação do Risco para Disfagia; NIHSS = National Institute of Health Stroke Scale

DISCUSSION

Dysphagia is considered to be morbidity after stroke and its manifestation is associated with an increased risk of pulmonary complications and mortality⁽⁹⁾. Mainly, impairment in varying degrees in the oral and pharyngeal phases of swallowing are verified⁽⁴⁾.

The present study had the aim to conduct clinical assessments because this is the only possibility for assessment available, besides being able to attribute a quick response and better knowledge regarding the patient's functional swallowing ability. Thus, diagnostic hypotheses could be elaborated and the feeding conduct could be established⁽⁶⁾. Although videofluoroscopy is considered an objective, gold standard test for the diagnosis of dysphagia, it is not always available or appropriate during the acute phase of stroke⁽⁷⁾.

Dysphagia, besides the high mortality rate, may trigger complications that impair functional recovery. Early diagnosis, as well as speech-language pathology intervention in a hospital setting, prevent aspiration during oral feeding, and allow decreased hospital stay, and return of the patient's independence⁽¹²⁾.

In this study, two patients had oropharyngeal dysphagia: mild in case 1 and moderate in case 2; and one had functional swallowing, in case 3. The risk for dysphagia was evaluated within the first 48 hours after stroke because of the possibility of spontaneous improvement of signs symptoms after this period.

In case 1, it was given the diagnosis of mild oropharyngeal dysphagia due to the presence of coughing after swallowing liquid consistency, associated with multiple swallows, residue in the oral cavity, and poor oral control of the bolus (escape out of mouth). The decreased level of consciousness presented by the patient required additional care in evaluation and throughout her stay in the hospital emergency. In a study that relates the consequences of dysphagia after stroke, the swallowing impairment with aspiration risk was related to the level of consciousness of the patient, and it was indicated, among other neurological signs, as a marker of stroke severity due to its interference on the quality of reflex responses^(12,13).

In case 2, it was diagnosed moderate oropharyngeal dysphagia, considering that the patient, during the clinical evaluation of swallowing, showed classic signs of aspiration with pasty and liquid consistencies, such as alterations in laryngeal mobility, in which the lack of vertical closure of the laryngeal vestibule prevents the airways to be protected

against aspiration. Moreover, the patient presented wet voice, which indicates stasis in the laryngeal vestibule⁽¹¹⁾. The increased oral transit time, common in stroke cases⁽⁴⁾, and positive cervical auscultation before and after swallowing also composed the case.

Case 3 was diagnosed with a functional swallowing because of compensation in the spontaneous act of swallowing. The occurrence of multiple swallows, observed with pasty consistency can be a sign of difficulty in oral propulsion, alteration of the swallowing reflex, or muscle paresis of the pharynx⁽¹¹⁾.

In a previous study, dysphagia was manifested especially during the first days after the occurrence of stroke; 51% of the cases had dysphagia in the first two days, and 27% within the following seven days. After six months, most swallowing difficulties were resolved, but about 8% of the patients still maintained the oropharyngeal dysphagia with aspiration risk⁽¹²⁾.

The bedside assessment of 160 patients within the first 24 hours of the onset of the vascular disease is described in a study available in literature. From the total sample, 54% had swallowing disorders. From these, 75% received oral feeding⁽⁴⁾. A prospective study with a sample of 121 patients with stroke evaluated within 24 hours of the onset of symptoms found that 51% had aspiration risk on admission⁽⁷⁾.

Regarding the localization of brain lesions, two patients showed impairment in the middle cerebral artery (anterior circulation territory) and one of them in the vertebral artery and the vertebrobasilar junction (territory of posterior circulation). These findings are validated by other studies that found a higher percentage of dysphagic patients with alterations in the carotid territory^(5,14). Infarcts involving the middle cerebral artery are responsible for the development of dysphagia, because they affect areas important for swallowing, such as the thalamus, internal capsule, insular subregion, and other subcortical areas⁽⁵⁾.

A study that assessed 50 patients with ischemic stroke within the first 48 hours of the onset of the stroke symptoms had the aim to correlate the manifestation of dysphagia with infarct area and volume. From the total sample, 44% developed lesions exclusively in the territory of anterior circulation, and all of them had dysphagia with pulmonary aspiration⁽¹⁵⁾.

The NIHSS was used in the present research to establish a reference value for the determination of the risk for dysphagia, since the scale approaches several aspects related to the neurological status, excluding swallowing⁽¹⁴⁾. Due to the small sample size, the precision of this value could not be established.

The sample obtained had three patients: two with dysphagia (NIHSS 15 and 19), and one with functional swallowing (NIHSS 11). In a study conducted with a sample of 50 patients after stroke, who had their swallowing assessed and the NIHSS applied within the first 48 hours of the onset of symptoms, it was possible to determine that the scale value of 12 or greater is considered a predictor of dysphagia⁽⁴⁾. In a similar study, it was established that 15 or greater in the scale can be considered an algorithm for the diagnosis of

dysphagia⁽¹⁴⁾. Hence, the results obtained in the present study showed a tendency to fit the averages above, establishing scores between 12 and 19 on the NIHSS as predictors for a manifestation of dysphagia.

FINAL COMMENTS

The high incidence of dysphagia after stroke, referenced in literature, and the risks of aspiration in patients assessed at the emergency room show the importance of the speech-language pathology assessment and early intervention. In the present study, the results suggest the confirmation of the relationship between severity of the neurological status and the manifestation of dysphagia, following a trend already expressed by other authors regarding the predictive factor for dysphagia in the NIHSS.

The limited sample was influenced by issues inherent to the researchers' work: the service flow in the hospital, and the patients' delay searching for medical care. In view of the relevance of this research, we suggest further studies in order to obtain considerable sample values, that would allow more precise inferences.

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