Avaliação fonoaudiológica e cintilográfica da deglutição de pacientes pós acidente vascular encefálico****

Clinical and scintigraphic swallowing evaluation of post-stroke patients

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Abstract
Background: deglutition of post-stroke patients. Aim: to study the swallowing of post-stroke patients through clinical and scintigraphic evaluations. Method: participants were 26 patients, who had suffered their first stroke within the last two months. The control group was composed by 15 healthy volunteers. Both groups were submitted to a clinical and scintigraphic evaluation of swallowing; using 5ml of liquid (water) and 5ml of paste bolus. Clinical evaluation was composed by an interview, an assessment of the oral structures (without food) and by a functional assessment (with food). Results: during the clinical evaluation, one individual of the control group presented inefficient larynx elevation and clinical signs of aspiration. As for the group of post-stroke patients, 27% presented inefficient prepare of the liquid bolus and 42% presented inefficient prepare of the paste bolus, in the oral phase. Considering the pharyngeal phase, 12% presented cough and choked. In the scintigraphy evaluation, three post-stroke patients were excluded from this analysis for the following reasons: two did not swallow during the exam acquisition time and one swallowed before the instruction given by the researcher. The group of post-stroke patients presented more oral residues and shorter pharyngeal transit with the paste bolus when compared to the control group. Conclusion: clinical and objective swallowing evaluations of post-stroke patients are necessary and important to determine therapy intervention and possible outcomes. Patients who have suffered stroke have more residues and shorter pharyngeal transit than healthy individuals. The scintigraphic method should be used more often as a research instrument to quantify the residue, transit time and clearance in each of the swallowing phases.
Key Words: Deglutition; Radionuclide Imaging; Stroke.

Resumo
Tema: a deglutição em pacientes pós Acidente Vascular Encefálico (AVE). Objetivo: estudar a deglutição de pacientes pós-AVE através de avaliação clínica fonoaudiológica e do método cintilográfico. Método: estudou-se 26 pacientes, sendo o primeiro AVE ocorrido há no máximo dois meses; o grupo controle continha 15 voluntários saudáveis; ambos grupos foram submetidos a avaliação clínica e cintilográfica da deglutição, ingerindo 5ml de líquido e 5ml de pastoso. A avaliação clínica constou de anamnese, avaliação estrutural (sem alimento) e funcional (com alimento). Resultados: durante avaliação fonoaudiológica, o grupo controle apresentou elevação laríngea ineficiente e sinais clínicos de aspiração em um indivíduo. Quanto aos pacientes, 27% apresentaram, na fase oral, um preparo ineficiente do líquido e 42% do pastoso. Na fase faríngea, 12% apresentaram tosse e engasgo. Na avaliação cintilográfica, três pacientes foram excluídos da análise, pois dois deles não deglutiram durante o tempo de aquisição do exame e um engoliu antes da instrução da pesquisadora. Os pacientes apresentaram maior quantidade de resíduo oral e menor duração de trânsito faríngeo na deglutição de pastoso, comparado ao grupo controle. Conclusão: a complementaridade da avaliação clínica e instrumental no estudo da deglutição de pacientes com AVE é necessária e importante para o desempenho do trabalho fonoaudiológico e para o paciente que será reabilitado. O método cintilográfico deve ser mais utilizado como instrumento de pesquisa para quantificar o tempo de trânsito, o resíduo e o tempo de depuração em cada fase da deglutição, estabelecendo-se parâmetros para outros estudos.
Palavras-Chave: Deglutição; Cintilografia; Acidente Vascular Encefálico.

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Introduction

The stroke diseases constitute the first death cause in Brazil with several consequences such as motor disturbs, speech or swallowing 1.2. The swallowing disorders in patients with neurological matters are called neurogenic dysphagia. Dysphagia is a common complication; however it is severe, at the stroke 4. and it is between 43% and 86% of the cases.

Neurological oropharyngeal dysphagia is a swallowing disturb which result into difficulties to prepare, organize, eject and transport the bolus through the oropharynx9.11. It is one of the principal factors of risk for occurring aspirative pneumonia 12-13.

The Speech and Language Pathology (SLP) therapy is fundamental to the patient in order to make him possible to recover feed abilities without risking his life. The evaluation of the ideal consistency that avoids the safest swallowing is very important.14

The increasing interest for dysphagia matters are requesting a large search for information related to the several aspects which are evolved in this subject15. One of these aspects are regarding to instrumental and clinical evaluation of patient for a correct diagnosis and efficient therapy16. The swallowing scintigraphic examination has been showed up as a quantitave method at significant relevance 17-20.

The objective of this report is to study the swallow in post-stroke patients through clinical evaluation and scintigraphic method.

Method

The study was constituted by 26 patients aged between 26 and 83 years old (mean age at 62). The patients showed ischemic stroke confirmed by neurologic and imaging examinations: they were followed up at the Neuro-Vascular Disease Ambulatory in Medical School of Ribeirão Preto - University of São Paulo. For inclusion, should occur ischemic stroke at less than two months ago, being this stroke the first episode of the vascular disease. There were some criteria for exclusion: having other further neurological diseases: which means occurring transitory ischemic accident or even hemorrhagic stroke.

This work was approved by the Human Research Committee of the Medical School of Ribeirão Preto - University of São Paulo - HCRP no. 8543/2002. Informed consent was obtained from all participants, they agreed with the realization and divulgation of this research and its results.

Fifteen healthy volunteers, aged between 27 and 86 years old (mean age at 58) are considered the control group. Their aged and sexes were compatible with the patients.

The clinical evaluation was performed into three steps: interview, structural evaluation (without food) and functional evaluation (with food).

At the interview it was noted some identification data and also about the stroke episode: date, local of lesion and imaging examination results; about the SLP approach, local, complaints, characterization of comprehension and use or non-use of dental prosthesis.

Other further data was collected at the neurogenic dysphagia evaluation protocol for adults21:

1. Feed and lung aspects: bronchopneumonia and feed less.
2. Complementary aspects: pleasure for feed - presence or absence.
3. Feed independence: total oral feed, partial oral feed and also with modifications at diet or by tube feeding.
4. Cognition: ability in attention and proper reply to the verbal commands; low attention level and improper replies or no reply.

At the structural evaluation, it was observed:

. Mobility - inefficiency for hypertonia or hypotonia;
. Sensibility - inefficiency: no reply to stimulus or no reaction to touch;
. Specific sensibility - inefficiency: no taste recognition;
. Oral reflexes - inefficiency: hypo or hyper active;
. Postural reflexes - inefficiency: absence for body control.

At functional evaluation, the aspects were classified as efficient, inefficient or absent, respectively:

Oral phase

Bolus capture

. Capture all food from the utensil precisely and with no escape;
. Capture improperly or partially of food;
. No capture of food.

Closing lips

. Closing lips with bolus remaining at the oral cavity;
. Partial escape of bolus or improper closing lips;

. No closing lips.

Bolus prepare

. Food into the mouth, being possible to observe the supra-hyoid muscle action, lateral and rotation of jaw for chewing;
. Maintenance of food for a long period into the oral cavity, presenting oral escape and difficult to tongue coordination;
. No external prepare movement which makes longer stasis.

Pharyngeal Phase

Laryngeal Elevation

. Laryngeal symmetric elevation and no trepidation;
. Asymmetry at laryngeal elevation and/or trepidation;
. No laryngeal elevation movement.

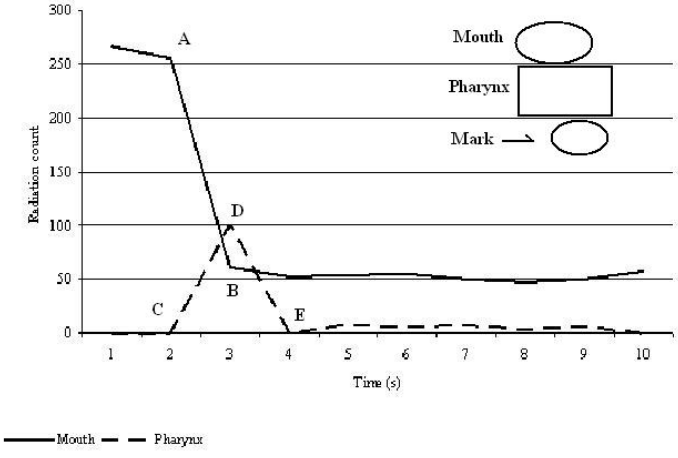
Nasal reflux

. Evidence or non evidence of reflux of food to nasal cavity.

Aspiration clinical symptoms

. Presence or absence of aspiration clinical symptom - cough, choking, cyanosis, sleepy, tiredness or dyspneia22.

Figure 1 - Schematic graphic for time-activity curve regarding to mouth and pharynx and schema for limitation of region of interest (ROI)



After that, scintigraphic evaluation was performed as previously described19, at sit position, in front of the equipment with swallowing of 5ml of water and 5ml of paste. This last one was obtained through the mixture of 4.5 g of instant food thickener (Thich Easy® Hormel Health Labs. U.S.A.) with 50 ml of water and powder juice. Liquid consistency was labeled with 37MBq of technetium-99m phytate, and it was labeled 55.5 MBq to the paste. The examination lasted 20 seconds for each consistency.

It was limited some regions of interest (ROI) at mouth projection (oval area with bolus, marked by the radioactive material) and pharynx (set between the mouth and the mark). An external mark was set at the level of cricoid cartilage in order to make possible ROI limitation. It was built some time-activity curves. In the mouth, it was measured the transit and residue; at pharynx, it was measured transit, depuration and residue. Transit corresponds to the time interval to the passage of posterior part of bolus; depuration consists to the interval between bolus arrival and leaving from the structure; residue is the amount of material which remains in the structure after swallowing (Figure 1: described at previous reports) 19.23

The statistic analysis was applied only to the scintigraphic evaluation and initially performed by observing if distribution was Gaussian or not, through Kolmogorov and Smirnov methodology. If positive, t test was applied and if negative, Mann-Whitney non-parametric test was applied. It was considered significant when the p value was <0.05.

Results

Regarding to anamnesis, 42% of patients did not show clinical complaints. In 77% of patients, the stroke occurred between 1 and 2 months and 23% of them in a period between 25 and 30 days. All the patients showed feed independence and absence of malnutrition and bronchopneumonia features (96.4%); cognition was efficient in 88.5%; 69% referred to pleasure in feeding and 31% complained about lack of hungry and taste changes.

Table 1 shows the structural and functional evaluation results. At structural evaluation, at control group, it was observed that 13% showed changes in the intra-oral sensibility and only one person showed changes in mobility, sensibility and reflexes.

Regarding to the patients, some aspects could not be evaluated due to lack of cooperation.

The principal changes were:

. 19% showed laryngeal trepidation or absence of elevation;
. 23% showed change of intra-oral sensibility;
. 27% showed change of specific sensibility.

At functional evaluation, 96% of patients showed efficient bolus capture and lip closing, during liquid and paste swallowing. Regarding to bolus prepare, 73% showed efficient prepare and 27% of them, inefficient in the liquid evaluation. At paste evaluation, 58% showed efficient prepare against 42% of inefficient one.

At pharyngeal phase, during liquid swallowing, 3 patients (12%) showed clinical symptoms of aspiration. At paste swallowing, 4 patients (15%) had clinical symptoms of aspiration. Regarding to posture, three patients (12%) showed absence of body control.

Regarding to controls, one person (7%), showed changes at laryngeal elevation and clinical symptoms of aspiration at both consistency and changes to oral prepare with paste bolus.

At scintigraphic examination, three patients were excluded from the analysis: two of them did not swallow and one of them swallows before instruction.

At liquid swallow there was not significant statistic difference of amount between the patient group and control group. At paste swallow, there was a significant statistic difference regarding to oral residue and pharyngeal transit between the patient group and the control group (Table 2).

TABLE 1. Fuctional and structural evaluation in controls and patients.

STRUCTURAL EVALUATION (NO FOOD)

Aspect	Structure	Pacients						Controls					
		E		I		IE		E		I		A	
		n	%	n	%	n	%	n	%	n	%	n	%
MOBILITY	Lips	24	92%	2	8%	0	0%	14	93%	1	7%	0	0%
	Tongue	24	92%	2	8%	0	0%	14	93%	1	7%	0	0%
	Soft Palate	23	88%	0	0%	3	12%	15	100 %	0	0%	0	0%
	Larynx	21	81%	**5**	**19 %**	0	0%	14	93%	1	7%	0	0%
SENSIBILITY	Facial	22	84%	2	8%	2	8%	14	93%	1	7%	0	0%
	Intra-oral	18	69%	**6**	**23 %**	2	8%	13	87%	**2**	**13 %**	0	0%
	Pharyngeal	21	80%	3	12%	2	8%	14	93%	1	7%	0	0%
SPECIFIC SENSIBILITY		17	65%	**7**	**27 %**	2	8%	14	93%	1	7%	0	0%
ORAL REFLEXES		24	82%	2	8%	0	0%	14	93%	1	7%	0	0%
POSTURAL REFLEXES		23	78%	3	12%	0	0%	15	100 %	0	0%	0	0%

FUNCTIONAL EVALUATION (WITH FOOD)

Consistency	Phase	Aspect	Pacients						Controls					
			E		I		A		E		I		A	
			n	%	n	%	n	%	n	%	n	%	n	%
Líquid	Oral	Bolus capture	25	96%	1	4%	0	0%	15	100 %	0	0%	0	0%
		Lip closing	25	96%	1	4%	0	0%	15	100 %	0	0%	0	0%
		Bolus Prepare	19	73%	7	**27 %**	0	0%	15	100 %	0	0%	0	0%
	Pharyngeal	Laryngeal Elevation	24	92%	2	8%	0	0%	14	93%	**1**	**7%**	0	0%
Paste	Oral	Bolus capture	25	96%	1	4%	0	0%	15	100 %	0	0%	0	0%
		Lip closing	25	96%	1	4%	0	0%	15	100 %	0	0%	0	0%
		Bolus Prepare	15	58%	**11**	**42 %**	0	0%	14	93%	**1**	**7%**	0	0%
	Pharyngeal	Laryngeal Elevation	24	92%	2	8%	0	0%	14	93%	1	7%	0	0%
			P		A				P		A			
			n	%	n	%			n	%	n	%		
Líquid	Pharyngeal	Nasal Reflux	0	0%	26	100 %			0	0%	15	100%		
		Clinical Symptoms of aspiration	**03**	**12%**	23	88%			**1**	**7%**	14	93%		
	Postur e	Cervical Control	26	100%	0	0%			15	100%	0	0%		
		Body control	23	88%	3	12%			15	100%	0	0%		
Paste	Pharyngeal	Nasal Reflux	0	0%	26	100 %			0	0%	15	100%		
		Clinical Symptoms of aspiration	**4**	**15%**	22	85%			**1**	**7%**	14	93%		
	Postur e	Cervical Control	26	100%	0	0%			15	100%	0	0%		
		Body control	23	88%	**3**	**12%**			15	100%	0	0%		

E – Efficient I – Inefficient A – Absence P – Presence IE – Impossible Evaluation

TABLE 2. Results of transit time and percentage of oral residue and transit, clearance and pharyngeal residue with liquid and paste.

	Transit (seconds)			**Clearance (seconds)**			**Residue (%)**		
				LIQUID					
Structure	*M*	*Med*	*SD*	*M*	*Med*	*SD*	*M*	*Med*	*SD*
Mouth									
Pacients	0,98	0,85	0,50	-	-	-	8,55	7,56	4,17
Controls	0,97	0,90	0,19	-	-	-	7,59	5,94	4,25
p		0,94			-			0,34	
Pharynx									
Pacients	0,71	0,50	0,47	1,24	1,10	0,50	8,96	8,16	5,12
Controls	0,71	0,50	0,46	1,08	0,90	0,49	12,41	5,81	14,67
p		0,81			0,32			0,30	
				PASTE					
Structure	*M*	*Med*	*SD*	*M*	*Med*	*SD*	*M*	*Med*	*SD*
Mouth									
Pacients	1,10	0,75	1,20	-	-	-	18,4	11,75	13,64
Controls	0,76	0,75	0,37	-	-	-	10,15	9,32	4,92
p		0,93			-			0,03	
Pharynx									
Pacients	0,48	0,45	0,17	1.05	0,90	0,61	11,72	9,69	7,46
Controls	0,61	0,60	0,18	1,04	1,05	0,25	16,24	9,61	16,44
p		0,02			0,97			0,22	

M – Mean Med – Median SD – Standard Deviation

Discussion

This report focused patients in their first-ever stroke episode. The evaluations were performed having as its target to analyze the swallowing process in these patients, since dysphagia is an important complication associated to the stroke, which is mentioned in one third of cases 4.5.8.24.

The clinical evaluation is a huge important step in these situations as a tool to identify swallowing changes and, this way, preventing complications such as aspirative pneumonia and avoiding the mortality which is related to aspiration. This evaluation must follow specific targets in order to

permit the person in charge of examination establish the dysphagia cause, the capacity of airway protection, the oral conditions for oral feed, the cognitive state and the clinical profile of the patient25, being this performed before any kind of instrumental evaluation15.

Although 23% of patients showed stroke between 25 and 30 days, this fact did not endanger the results since all of the patients have been feeding independently by oral way and presented stable motor and clinical. The dysphagia is recoverable for more than 80% of cases from two to four weeks from the stroke occurrence, having a medium time of 8 days 5.26. However, this disorder may lead to dehydratation, lung and nutritional complications.

The changes at structural evaluation were observed in patients and controls. At the last ones, these structural changes occurred with people aged more than 70 years old. The natural process of aging may cause difficulties for swallowing after stroke23,26-27. The intra-oral sensibility reduction make the food less realizable to the mouth: these very small parts may be aspirated before the pharyngeal phase28, evidencing the importance of clinical evaluation. Such structural changes may cause difficulties at the swallowing dynamic as the ones which occurred in the objective examination.

At functional evaluation, the changes in the oral phase were observed in patients and controls and enable identification of factors that may start posterior problems at swallowing and the possibility of proper work development in each phase. At oral phase, the structures which are evolved and the relation among themselves must be preserved in order to assure an efficient dynamic. The integrity and the synchronism with the other further phases are essential conditions for the process success 28.

Regarding to pharyngeal phase, some clinical signals of aspiration such as cough, chokes, nasal regurgitation and nasal voice indicate difficulties which may have neurological disorders as base between them and the stroke 28. Being aware of swallowing dynamic and associating this fact to clinical practice enable the therapist to identify, analyze and classify the results, become easier the definition of therapeutic and also to establish a plan for objective examinations 29.

At scintigraphic examination, the residue presence in oral phase confirms the results of functional evaluation where we observed an inefficient prepare. The last one, with improper capture of food, intra-oral sensibility change and difficulties for tongue base movement may cause oral residue which will change the course of swallowing process.

At pharyngeal phase, it was observed faster transit of paste bolus in patients comparing to the controls. The most amount of oral residue in stroke patients, with this kind of bolus, may have decreased the volume that effectively reaches the pharynx, thus in the patients a smaller volume passed through the structure. It is possible that this faster transit is related to aspiration clinical symptoms and it suggests incoordination in the process; it also may be characterized as a swallowing complication in patients post-stroke, causing risks to safe feed.

The correlation between objective examination and clinical evaluation is fundamental for the therapy: one of them supplies relevant information to the other, proves the importance for this complementary for the development of SLP therapy and also for the patient who will be rehabilitated 30.

Conclusion

The association between clinical and instrumental evaluation of swallowing in patients post-stroke have enabled a correct diagnosis and efficiency at the rehabilitee process. The scintigraphic method has been presented as an important research instrument in order to quantify the residue, transit time and clearance in each swallowing phase, so this way it establishes parameters for other studies.

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