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A Swallowing Clinical Assessment Score (SCAS) to evaluate outpatients with Parkinson's disease

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ABSTRACT

Aims: This study proposes a standardized Swallowing Clinical Assessment Score (SCAS) in PD.

Methods: 174 idiopathic PD patients and 22 controls were evaluated in a transversal study. The SCAS comprised of twelve items that identify the occurrence of specific alterations in the oral and pharyngeal phases. Each alteration was given a weight in accordance to its relevance in compromising the act of swallowing.

Results: The SCAS follows a theoretical scoring system ranging from 0 to 354 points, where zero corresponds to the ability to swallow without alteration. Scores ≤ 2 points indicate normal swallowing; functional swallowing ranges from ≥ 2 and ≤ 15 points; mildly altered ranges from ≥ 15 and ≤ 35 points; moderately altered ranges from ≥ 35 and ≤ 60 points. Scores in excess of 60 points indicate severe alteration.

Conclusions: The SCAS proposed here is only part of the global assessment of dysphagia. Its main applications are: to screen swallowing difficulties in PD, even with no complaints, thus facilitating early diagnosis; to monitor the development of alterations in swallowing in an objective manner; and to assess the effectiveness of strategies for swallowing rehabilitation.



INTRODUCTION

Nowadays the non-motor symptoms of Parkinson's disease (PD) have received more attention from clinicians and researchers due to their impact on the quality of life of the patient. Dysphagia is frequently described as an important cause of death in PD patients related to respiratory infection and aspiration pneumonia.¹

In a recent review of the literature, only two scales for evaluating dysphagia in individuals with PD have been suggested², both being based on data obtained through patient questionnaires. Instrumental tests such as video fluoroscopy or fiber-optic endoscopic evaluation of swallowing to identify altered events of swallowing are not available for the majority of the population in Brazil. Besides being available in few hospitals, decreased motor abilities of patients and costs make it difficult to perform these exams. Most health services use clinical evaluation for detecting dysphagia. It is necessary to standardize and quantify this evaluation in order to follow the progress, therapeutic response, and gravity of dysphagia in an objective manner.

Our objective was to propose a rating scale for the quantitative measurement of swallowing performance in patients with PD, based on the application of a standardized functional clinical test for swallowing – the Swallowing Clinical Assessment Score (SCAS).

METHODS

Design and study population

A total of 174 idiopathic PD patients under treatment at the Movement Disorders Outpatient Clinics of São Lucas Hospital at the Pontifical Catholic University of Rio Grande do Sul, and University Hospital Professor Edgard Santos at the Federal University of Bahia, were evaluated in a transversal study. Patients were excluded due to: other associated neurological or vascular diseases, traumatic brain injury, severe cognitive impairment and alterations that impair mobility and sensitivity of the oropharyngeal region. Also assessed were 22 control patients, balanced by age and gender, and having no history of neurological or laryngological disease.

All patients were submitted to a clinical assessment of swallowing, under a protocol drawn up by the two services. All patients were evaluated during 'on' periods of medication used for the control of PD. The Ethics Committee of the two institutions approved the project and all participants signed informed consent forms.

Swallowing assessment protocol

The SCAS comprised of twelve items that identify the occurrence of specific alterations in the oral and pharyngeal phases. Testing was carried out using three bolus consistencies: liquid (water), paste (yogurt), and solid (1 biscuit), in standardized volumes of 20 ml for the liquids, 10 ml for the paste and one swallowing of solid consistency, comprising a total of 3 swallows evaluated. The test assessed the alterations described below:

- **Oral phase:** *Altered lip closure; labial discharge; prolonged oral transit time* (in excess of 4 seconds); *residue* (the presence of left over bolus in any part of the oral cavity after each swallow).
- **Pharyngeal phase:** *multiple deglutition* (the occurrence of more than one swallow immediately following the first); *reduced larynx elevation* (when the hyoid bone movement was not well sustained); *altered cervical auscultation* (presence of sounds during the respiration/swallow/respiration sequence, and not having been observed prior to the offer of the bolus).
- **Signs of penetration/aspiration:** *throat clearing; cough; choking; change of voice quality* (observed upon the production of the sustained /a/ vowel after each bolus was swallowed); *alteration in breathing* (changes in respiratory frequency, lack of respiration/swallowing coordination, dyspnea, fatigue).

Definition of scoring

All patients were submitted to the assessment described above, performed by speech therapists specializing in dysphagia, and trained beforehand in order to standardize data gathering. Tests results were noted in a standardized form for later analysis. The final weight for each alteration was determined in the steps described below:

- **Step 1:** Each alteration was given a weight in accordance to its relevance in compromising the act of swallowing, based on clinical evidence from literature. For each of the three swallows the evaluator would note which, if any, alterations had occurred. Each person evaluated received a final score of the sum of the alterations found.
- **Step 2:** Every form was independently analyzed by three speech therapists that were blind to the weight attributed to each alteration and the patient's quantitative score. The speech therapists qualitatively classified the patients and controls into five categories: normal; functional; mildly altered; moderately altered and severely altered.

The dysphagia outcome and severity scale³ was used as a base, adapted for the clinical signs that indicate alterations in swallowing.

- **Step 3:** The qualitative classifications by each speech therapist were compared and any disagreements were discussed until a consensus on classification was reached.
- **Step 4:** For each category of the qualitative classification a mean, standard deviation, and minimum and maximum values were calculated using the quantitative scores from the evaluations of the patients and controls.
- **Step 5:** Individuals with extreme discrepancies between their quantitative and qualitative scores were discussed again and adjusted, both for the weight attributed to each alteration and for the criteria that conferred the subjective degree of severity.
- **Step 6:** Steps 4 and 5 were repeated with a second round of discussions, until the final weight attributed to each alteration was defined.

Analysis of the data

All data was entered into a database developed for the project using the application FILEMAKER®, and analyzed using the statistical software package SPSS, version 17. The SCAS was described for each category of severity of swallowing alteration through means, standard deviations, medians and inter-quartile ranges, and represented graphically using a boxplot.

RESULTS

The SCAS was applied to 174 PD patients (age: 65.2±11.4; disease duration: 7.0±5.3), and 22 control subjects. All participants safely completed the evaluation.

As shown in Table 1, the SCAS follows a theoretical scoring system ranging from 0 to 354 points, where zero corresponds to the ability to swallow without alteration. Scores were distributed according to severity of events, with 18 points for alterations in the oral phase, 66 for alterations in the pharyngeal phase, and 270 for events related to penetration/aspiration.

The proposed SCAS cut off points for classifying the function of swallowing into the categories of normal, functional, mildly altered, moderately altered and severely altered for PD patients is presented in Figure 1, based on mean values, median, and interquartile intervals found in each of the qualitative classification categories of the population studied. Scores in SCAS ≤ 2 points indicate normal swallowing; functional

swallowing ranges from ≥ 2 and ≤15 points; mildly ranges from ≥ 15 and ≤ 35 points; moderately altered ranges from ≥ 35 and ≤ 60 points. Scores in excess of 60 points in this clinical assessment indicate severe alteration.

Table 1. Score attributed to each event suggesting alteration in the dynamic of swallowing

Signs suggesting alteration in swallowing found during assessment	Score	
	for each offering	max. possible
ORAL PHASE		
Altered lip closure	1.0	3.0
Labial discharge	1.0	3.0
Prolonged oral transit time	2.0	6.0
Residue	2.0	6.0
Total		18.0
PHARYNGEAL PHASE		
Multiple deglutition	2.0	6.0
Reduced larynx elevation	10.0	30.0
Altered cervical auscultation	10.0	30.0
Total		66.0
SIGNS OF PENETRATION/ASPIRATION		
Throat clearing	10.0	30.0
Cough	15.0	45.0
Change voice quality	15.0	45.0
Choking	20.0	60.0
Alteration in breathing	30.0	90.0
Total		270.0
TOTAL		354.0

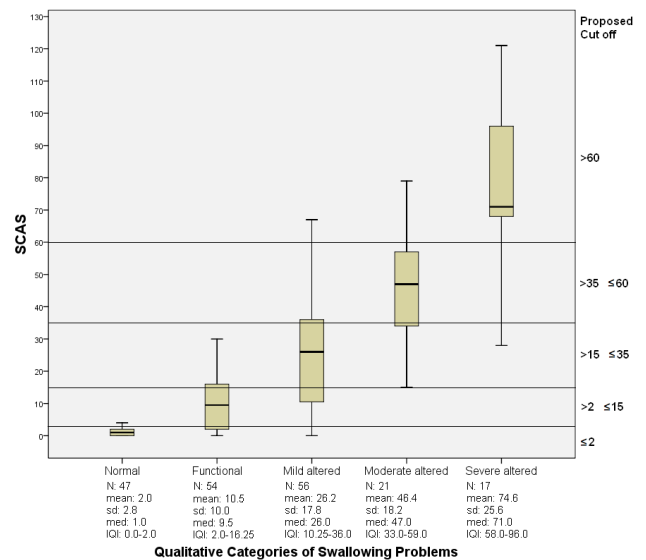


Figure 1. Boxplot distribution of SCAS scores in the population studied and the cut off points

DISCUSSION

The life expectancy of the PD patient is directly related to the consequences of the dysphagia scenario⁴ making a systematic assessment of swallowing a necessity. The scores proposed in our instrument were based upon studies whose aim was to identify which clinical signs are most relevant in detecting dysphagia⁵.

Modification in breathing, choking and vocal alterations during swallowing was also considered to have a high predictive validity for aspiration indicating dysphagia during a swallow test⁶. In our scale, modifications in the pattern of respiration during the assessment received the highest number of points, followed by the presence of choking. The presence of material in the larynx could also generate more than one type of alteration, such as a wet, harsh and hoarse voice⁷. In our proposal, the presence of any change in the voice was also considered.

Clinical assessment using food in different consistencies showed better sensitivity (90%) and specificity (56%)⁸. Our tool proposes to evaluate by using three consistencies of food, in different volumes. With this we believe we can achieve not only better accuracy, but also more quantitative discrimination. Although some events in the dynamic of swallowing have little correlation with the presence of aspiration, such as cervical auscultation alteration, they have clinical relevance when taken into account with other symptoms⁹.

It is fundamental that aspects such as the level of consciousness of the patient, nutritional state, ability to feed themselves and time spent during meals are taken into consideration for the final diagnosis of dysphagia¹⁰. The SCAS proposed here is only part of this complete assessment. We suggest that when an evaluation cannot be done safely, it should add the maximum points for each consistency not evaluated. The cut-off scores, as can be seen in figure 1, discriminated between patients classified as normal, functional, mild, moderate, and severe.

This protocol is an easy to apply and low cost diagnostic tool, able to track swallowing difficulties in patients with PD who are clinically stable and collaborative. The use of scoring makes it easier to assist epidemiological studies, to follow the progress of the disease, and objectively quantifies the response to therapy. Its use in speech therapy practices will bring new adjustments, helping perfect the instrument.

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