

Communicative processes of individuals with injuries of the right cerebral hemisphere

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ABSTRACT

Objective: This study aimed to profile the language skills of patients with damage to the right cerebral hemisphere attended at the *Ibirapuera* Unit (Central) of the Association for the Welfare of Handicapped Children - AACD (*Associação de Assistência à Criança Deficiente - AACD/Unidade Ibirapuera - Central*), and to discover the perceptions of caregivers and patients regarding the presence or absence of language disorders after a stroke. **Method:** The descriptive study was conducted from July to September of 2009 with 11 adults through the application of the Montreal Communication Evaluation Battery (known in Brazil as Bateria MAC) tests, the Questionnaire on Awareness of Difficulties, and the Communicative Disorders Screening on individuals with neurological conditions, direct relatives, and/or caregivers. **Results:** It was found that 90.9% of patients with injuries of the right cerebral hemisphere had a deficit in at least one of the tests comprising the Bateria MAC assessment of language. **Conclusion:** Findings showing the patient's absence of awareness of their linguistic and cognitive deficits are also very important, not only about their daily life activities, but about their agnosia.

Keywords: Stroke, Language Disorders, Agnosia, Communication

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INTRODUCTION

Affections of the Central Nervous System can cause a variety of losses in individuals' communications. These losses can be manifested as an impairment of expression as much as in the understanding of language,¹ as well as in right hemisphere alterations.

Language is studied in its various aspects: syntactic (organizational rules for forming sentences), semantics (meaning of the words), phonological (combinations of sounds to form words), and morphological (lexical formation rules), where the role of the left hemisphere is known.^{1,2} Linguistic thought, analytical reasoning, verbal memory, and the production of language expression are also aspects related to the left hemisphere.³

Although the predominant area for language has been strictly connected to the left hemisphere, clinical and experimental findings suggest that the right hemisphere also plays an important role in many communicative aspects. This fact was made evident in a study of patients who had suffered a stroke in their right hemisphere (RH) by the impairment of the receptive and expressive language abilities necessary for the social discourse.⁴

The functional linguistic aspects related to the use of the language are more associated with the RH. There are three of these aspects: the pragmatic (related to the communicative context), the semantic, more connected to connotative meanings (meaning of non literal linguistic content), and the prosodic (associated to the stress of the different vocal intonations).^{5,6,7}

The individual with Right Hemisphere Injury (RHI) may find it difficult to respect communication rules during a conversation (dialogic turn exchange), to transmit his communicative intentions based on emotions that modulate the prosodic parameters of his speech, and to understand the use of indirect or figurative meanings of the language.^{1,6}

There are also impairments in the textual interpretation of adults with RHI, characterized as a failure in lexical-semantic activation, necessary for verbal understanding.^{8,9} Any deficits in these components hinder communication with another individual. However, affected individuals often go unnoticed by health professionals because the latter do not know about certain alterations, which are as yet poorly studied.^{1,6}

Taking into consideration that most RHI patients lack the perception of their own language impairments, family members may complain about the effectiveness of their communication.²

Thus, language alterations caused by RHI such as stroke, encephalic cranial trauma, and dementia, among others,⁷ are evident in neurological populations.

The effects of a stroke are frequently evaluated through language tests that verify the performance of patients and most times these patients cannot quantify the alterations imposed by the stroke, which affect the different daily life activities and the communication of these individuals.¹⁰

There are protocols such as the Right Hemisphere Language Battery-RHLB, which are capable to evaluate the language alterations in individuals with RHI. In a study with a group of individuals with a RH cerebral tumor, alterations related mainly to their discourse were observed.¹¹

The Montreal Communication Evaluation Battery was adapted, standardized, and validated in Brazil by Fonseca et al.⁷ specifically to evaluate the discursive, pragmatic, lexical-semantic, and prosodic components of language in individuals with RHI in this country, and is, therefore, known as MAC Battery (or *Bateria MAC*).

Therefore, the action of both cerebral hemispheres together provide real communicative competence,¹² since the left hemisphere is responsible for the structural linguistic aspects and the right, for the functional aspects.^{6,7}

OBJECTIVE

The present study seeks to trace a language profile for RHI patients treated at the *Associação de Assistência a Criança Deficiente - AACD/Unidade Ibirapuera - Central* (Association for Assistance to Deficient Children/Ibirapuera Unit-Central), as well as to verify the perception of caregivers and patients on the possible presence of post-stroke language alterations.

METHOD

In this study, 11 adults diagnosed with Middle Cerebral Artery (MCA) stroke and treated for Acquired Brain Injury (ABI) at the Association for Assistance to Deficient Children - AACD. The age bracket for this

sample ranged from 44 to 68 years and the education ranged from incomplete elementary school (minimum of 2 years of schooling) to undergraduate level (more than 8 years of schooling). As to the gender distribution of the 11 participants, there were 7 females and 4 males.

For inclusion in the study the subjects had to be adults, born in Brazil, with at least 2 years of schooling, fluent in Brazilian Portuguese, and who suffered an ischemic or hemorrhagic stroke diagnosed with neuroimaging techniques showing no other neurological diagnosis such as tumor, TCE, or others. The exclusion criteria for the study were based on medical records; adults with their injury for less than six months or with psychiatric and sensory disturbances (uncorrected auditory and/or visual disturbances) were not included.

The study was transversal and descriptive and applied the Montreal Communication Evaluation Battery/MAC Battery.⁷ The evaluations were made individually at the Association for Assistance to Deficient Children - AACD - Central Unit, from July to September of 2009, whose dates were agreed with the availability of the individuals and/or responsible persons. The applications of the MAC Battery occurred in one only session, lasting approximately one hour and thirty minutes to two hours and thirty minutes, with the latter case having a break of 15 minutes; the tasks were recorded, transcribed and analyzed in a specific protocol as proposed by Fonseca et al.⁷

This Battery evaluates the discursive, pragmatic, lexical-semantic, and prosodic communicative processes by means of the following 14 tests: questionnaire on the awareness of difficulties (I), conversational discourse (II), metaphor interpretation (III), unconstrained verbal fluency (IV), linguistic prosody with subtests on comprehension (V) and repetition (VI), narrative discourse (VII) (composed of subtests: partial retelling, total retelling, and comprehension questionnaire), lexical evocation/verbal fluency with orthographic constraint (VIII), emotional prosody with subtests on comprehension (IX) and repetition (X), indirect speech acts interpretation (XI), verbal fluency with semantic constraint (XII), subtests on emotional prosody production (XIII) and semantic judgment (XIV) (composed of identifications and explanations scores).

During the application of the MAC Battery, individuals were classified as to whether they had any deficit in each test mentioned above.

In the questionnaire on Awareness of Difficulties (I), individuals were classified as to whether they presented a deficit. In that test they were led to consider the following question: "Do you have difficulty communicating with others most of the time?", to which the patient should answer only Yes or No.

The questionnaire Triage of Communicative Disturbances in Individuals with Neurological Conditions, was applied to family members and/or caregivers of the patient, and there was the following question: "Have you noticed any change in the way your family member/friend communicates after the stroke?" The family member should answer Yes or No; if Yes, there would be another question: "What do you think has changed in his/her communication?"

Later, the data from the questionnaire on awareness of difficulties (I) was compared to the Triage of Communicative Disturbances in Individuals with Neurological Conditions questionnaire that was applied to the respective family members and/or caregivers to verify their perception and also the patient's perception of language alterations after the stroke.

After collecting data, the results were submitted to a descriptive analysis. It is noteworthy that the project for the present study was approved by the Ethics in Research Committee of the Association for Assistance to Deficient Children - AACD (No. 032/2009), fulfilling all the ethical requirements expected in research involving human beings. The participation of the individuals in the study was voluntary, and the subjects and their families or responsible persons signed the Free and Informed Consent Form.

RESULTS

The MAC Battery was applied to 11 adults with RHI, from 44 to 68 years old and average age of 54.6 years. Results showed that 90.9% of the patients presented some deficit in one of the tests evaluated.

In Figure 1, we see that the tests that showed the most alteration were Emotional Prosody (production) with 72.7%, followed by Conversational Discourse (63.6%). There was no deficit from any patient in Semantic Judgment (Identifications score).

In Figure 2, we see that in the Awareness of Difficulties questionnaire, 81.81% of the patients did not show any difficulties to communicate.

However, in Figure 3 we see that in the Triage of Communicative Disturbances in Individuals with Neurological Conditions, applied to family members and/or caregivers of the patient, 80% of the caregivers mentioned changes in the way the patient communicated after the stroke, although it is important to mention that only 10 caregivers answered this questionnaire, for one sample subject came without his caregiver. From the 80% who mentioned change in communication, there were reports of alterations in mood and attention, the use of inappropriate words, and of increased communication in the family environment.

It is important to point out that, according to figures 2 and 3, 80% of the family members and/or caregivers mentioned changes in the communication of the patients, since only 18.19% of the subjects was aware of his or her difficulties.

DISCUSSION

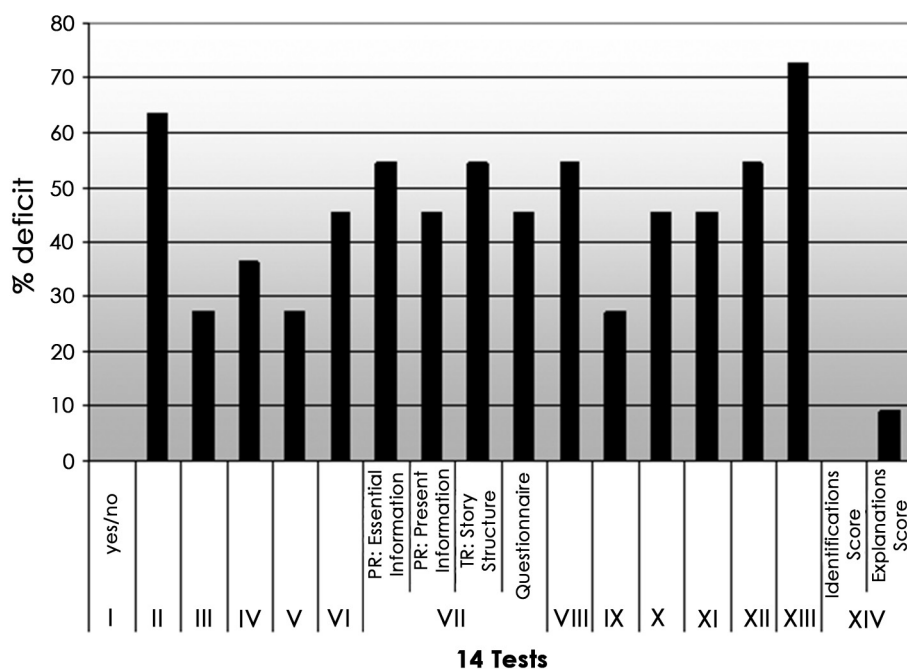
Linguistic alterations in RHI are still unknown and not well investigated, currently

showing meager literature. However, strong interference of these linguistic-cognitive alterations is seen in these patients in their interpersonal relating, in the expression and comprehension of emotions.

The clinical evidence suggests that adults with RHI are indifferent to nonliteral meanings that are related to idiomatic expressions and other figurative forms of language.¹³

The most important consequences of RHI negligences are visual and spatial problems and other cognitive syndromes.^{14,15} Anosognosia has been associated with RHI, since patients with left hemisphere injury are frequently excluded from this investigation, due to more accentuated language comprehension and/or expression deficits associated.¹⁶

Agnosia, or any alteration in the perception of deficits, occurs when there are injuries situated in the associated cortex. Currently, it is believed that neurons from polysensory convergence regions develop their synaptic connections from learning and, when stimulated, they act through retro-activation on neurons



I: Questionnaire on Awareness of Difficulties (applied to the patient); II: Conversational Discourse; III: Metaphor Interpretation, Explanation subtest; IV: Unconstrained Verbal Fluency; V: Linguistic Prosody, Comprehension subtest; VI: Linguistic Prosody, Repetition subtest; VII: Narrative Discourse (composed of Essential Information Partial Retelling, Present Information Partial Retelling, Story Structure Total Retelling and Questionnaire); VIII: Verbal Fluency with Orthographic Constraint; IX: Emotional Prosody, Emotional Comprehension subtest; X: Emotional Prosody, Repetition subtest; XI: Indirect Speech Acts Interpretation; XII: Verbal Fluency with Semantic Constraint; XIII: Emotional Prosody, Production subtest; XIV: Semantic Judgment

Figure 1. Results from the application of the 14 tests, showing the percentage of deficits

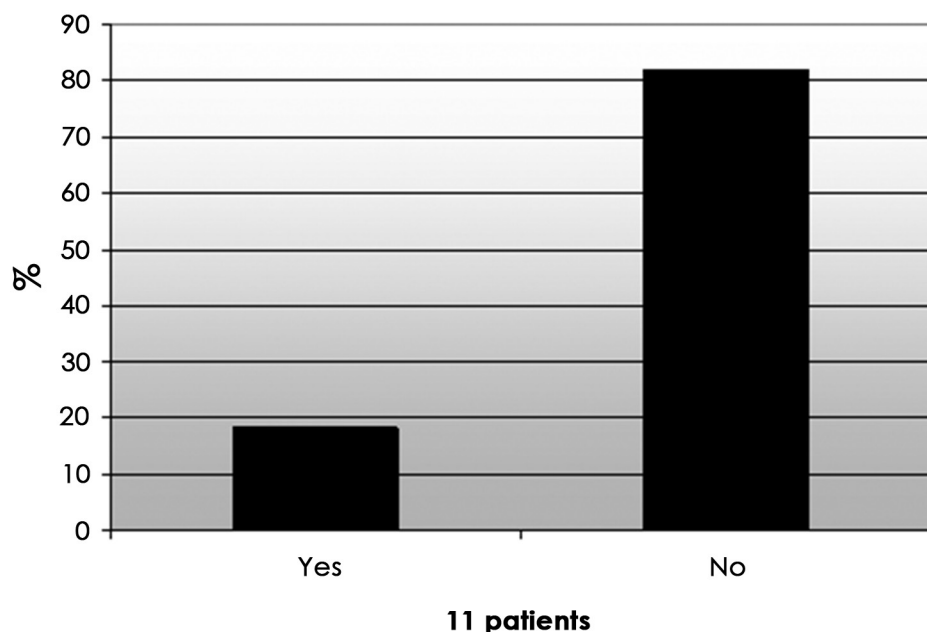


Figure 2. Results from the Questionnaire on Awareness of Difficulties, showing presence (yes) or absence (no)

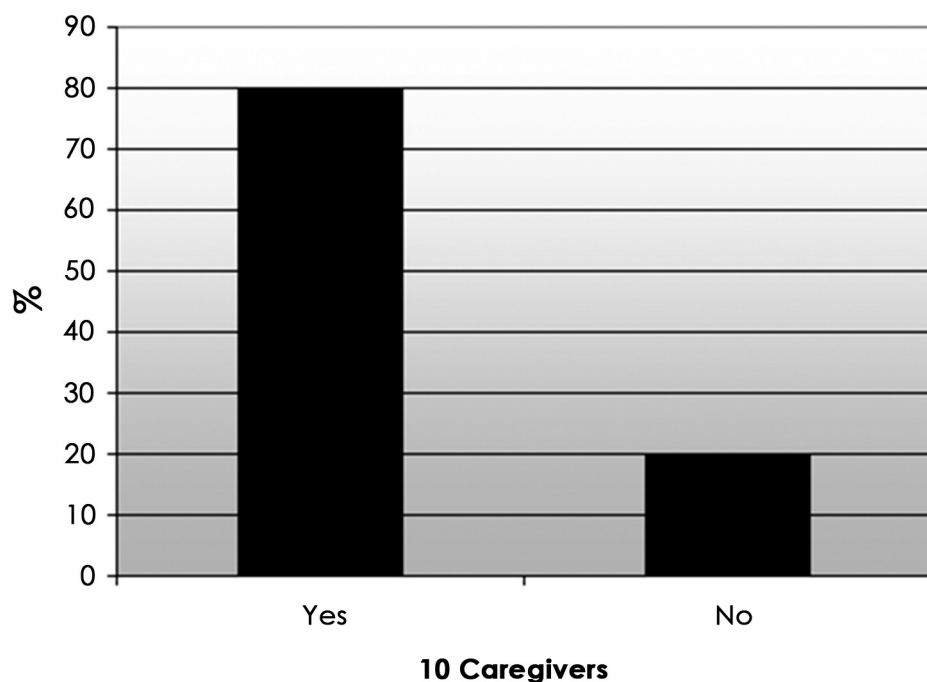


Figure 3. Results of the application of the Triage of Communicative Disturbances in Individuals with Neurological Conditions to family members and/or caregivers of the patients, showing presence (yes) and absence (no)

of various cerebral areas, reconstituting the neuronal activity standard responsible for the perception.¹⁷

Cognitive losses mainly underlie productive disorders, intimately associated with spatial negligence due to the RHI. Recently, it was proposed that these disorders may be attributed to the impairment of different levels of motor control.¹⁸

Studies show that individuals with RHI may present difficulties in respecting communicative rules during a conversation, in transmitting communicative intentions based on emotions that modulate the prosodic parameters of their speech, and in understanding the use of indirect or figurative meaning of language,^{1,6} which corroborates the findings in 90.9% of the patients of the present study, characterized by deficits connected to the functional aspects of language in at least one of the MAC Battery tests applied.

The cognitive functions of visual-spatial attention and perception, body scheme, social and emotional intelligence, and recognition of facial expressions are linked to the RH.³ Other cognitive functions influence the language such as planning, the initiation of the motor articulation activities, and working memory, that interfere in verbal comprehension.¹² Depression, cognitive deficit, and visual-perceptual deficit are often present in this population and aggravate their emotional language and mood.¹⁹

The finding with the largest deficit (72.7%) in the present study is strictly connected to Production in Emotional Prosody. This was also confirmed by the contribution to linguistic structure in vocal expression and in emotional behavior.^{7,20}

The results for Conversational Discourse test, which showed an alteration in 63.6% of the patients in the present study, were not compatible with the study in which the major loss was connected to Narrative Discourse test.⁷ However, another study found that the main alteration in groups of individuals with RH cerebral tumor was impairment in the discursive communication process.¹¹

The Semantic Judgment (Identifications Score) test was the only one that did not confirm alterations. Similar to another study, the results obtained in this test were analogous to those of RHI individuals, when compared to the results of normal individuals.⁷

Individuals with RHI, in large part, do not perceive their language alterations. We confirmed this with the Awareness of Difficulties questionnaire, in which 81.81% of the patients in this research have no complaints as to communication.²

Disorders associated to RH can be characterized by deficits in the cognitive functions of attention, perception, memory, motor skills, and executive functions, with the presence of anosognosia, sensory hemi-negligence, prosopagnosia, visual-spatial and working memory alterations, constructive dyspraxia, and executive dysfunction. As for communication skills, it includes alterations in the discursive, pragmatic-inferential, lexical-semantic, and prosodic components. Deficits in emotional processing include difficulties in understanding and producing emotions based on facial expressions or vocal emissions and neuropsychiatric alterations.²¹

In this way, there are no complaints on the part of the patients about the impact of the injury on their lives because they have no perception of those deficits.

Still, family members and caregivers may have complaints about the effectiveness of their communication, as seen in the Awareness of Caregivers Difficulties questionnaire, in which 80% of them mentioned language alterations.²

The complaint from family members and/or caregivers was in relation to the language, cognition, and communication, characterized by alterations in mood, attention, use of inappropriate words and increased communication in the family environment. Depression, cognitive and visual-perceptual deficits, which may be present in this population, aggravate emotional language and mood.¹⁹ Such alterations affect the different forms of daily life and communication of these individuals.¹⁰

As for cognitive and behavioral aspects, there is similarity among individuals with right hemisphere injury and frontal injury concerning communication aspects.²² It is important to consider the cognitive performance of the patients, as well as the need for a cognitive evaluation to compose and base the communications findings for these individuals. Therefore, attention

from Speech Therapists and other health professionals is necessary, since the RHI can create linguistic-cognitive alterations with unknown paths and relationships.

In general, it can be said that there is a variation in the presence of deficits in the different tests of this study, which means that RHI patients are not always marked by linguistic-cognitive alterations, even if it occurs in the majority. This can be explained by the influence of uncontrolled variables (characteristics distinct from hemispherical injuries - location and extension of the injury, time after injury - or sociodemographic characteristics of the individuals).

Therefore, we can say that most RHI individuals show communications deficits, encompassing discursive, pragmatic-inferential, lexical-semantic, and/or prosodic alterations. The right hemisphere is thus considered as having an active role in the communicative-linguistic processing.

Finally, it is important to say that the anosognosia present in these patients is a strong sign of the need for therapy, having as a reference the perception of the patients in relation to their linguistic deficits. The speech therapist is responsible, then, for pointing out the alterations and for working the individual's perception in relation to them, favoring social communication.

CONCLUSION

It was verified that 90.9% of the RHI patients showed deficit in at least one of the tests that composed the MAC Battery for language evaluation. The largest deficit was shown in Emotional Prosody (Production subtest) with impairment of 72.7% of the individuals, followed by Conversational Discourse, with 63.6%. There was no deficit for any patient in Semantic Judgment (Identifications score).

The findings concerning the absence of perception of the patients of their own alterations are also extremely important, not for the absence of impacts on their daily life, but due to agnosia. This is confirmed, for according to family members and/or caregivers, the alterations that appear after the RHI are evident in daily life.

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