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Case Report

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Neuropsychological rehabilitation of Broca's and conduction aphasia Case report

Summary

Vascular events represent the third cause of death and are also one of the main causes of disability in adulthood. Among the most frequent cognitive sequelae are the aphasia. There is a need to carry out clinical interventions that allow the person with aphasia to rehabilitate language, have quality of life and return to their usual activities. The functional reorganization approach of A. R. Luria proposes that after brain injury cognitive abilities are disorganized, but that through a neuropsychological intervention they can be recovered, at least partially. It is essential to restructure the lost ability and make a change in the psychophysiological structure. We present the case of a 44-year-old man who, after a cerebral infarction, was diagnosed with mixed aphasia: Broca and conduction aphasia. A rehabilitation program based on the functional reorganization approach was started. After 60 sessions, an improvement in automatic language, repetition, naming, and spontaneous language was observed. Likewise, independence for daily activities, family and social interaction increased.

Keywords: vascular events, Broca's aphasia, conduction aphasia, neuropsychological rehabilitation

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Introduction

Vascular events represent the third cause of death and are also one of the main causes of disability in adulthood.[1] The sequelae involve physical alterations and cognitive deterioration.[2] Among the most frequent cognitive sequelae are aphasias.[3] Therefore, there is a need for clinical interventions that allow the person with aphasia to rehabilitate language, have quality of life and return to their usual activities. There are different aphasia rehabilitation approaches. These include the stimulation approach, the behavior modification approach, the pragmatic approach, the neurolinguistic approach and the functional reorganization approach.[4]

The functional reorganization approach of A. R. Luria proposes that after brain injury the cognitive abilities are disorganized, but through a neuropsychological intervention they can be recovered at least partially. For this, to restructure the lost ability, a change in the psychophysiological structure[5] is necessary. When brain injury occurs, the higher levels of cognitive processes are mostly affected, those that require a greater degree of voluntary control, meanwhile the levels in which there is a higher degree of automation remain intact. Thus, neuropsychological rehabilitation seeks to generate new functional systems through two mechanisms: one is through the transfer of the functions of the damaged area to other intact brain regions, the second consists of consolidating the damaged function in the residual processes that remained unharmed after the injury.[6] We present the case of a 44-year-old man who, after a cerebral infarction, was diagnosed with mixed aphasia: Broca and conduction aphasia.

Case report

This is a 44-year-old man who suffered a cerebral infarction in the left middle cerebral artery (Figure 1), causing right hemiparesis of the lower and upper limbs, in addition to a severe language impairment. Two years after the infarction a neuropsychological evaluation was conducted. Difficulty in the beginning of the speech was identified, with a marked presence of perseverations. Additionally, an alteration was observed in the selection of articulation of phonemas with problems in finding the point and mode of articulation necessary to produce words. These findings allowed the diagnosis of mixed aphasia: Broca's aphasia and conduction aphasia. Despite the time that had passed since the patient had the infarction, it was decided to start a neuropsychological rehabilitation program.

Figure 1 Axial CT image two years after the infarction showing hypodensity in the frontal and parietal regions.

Methodology

A rehabilitation program was initiated based on the functional reorganization approach.[7,8] A total of 60 sessions were held, once a week, with a duration of 45 minutes. The intervention was divided into 5 stages, in which specific exercises were performed for each of the two types of aphasia (Table 1). In the preliminary stage, the purpose was to unblock the language, for which activities involving automatic language were executed, such as singing songs known to the patient, saying the months of the year and the days of the week.

In the first stage, individual word denomination ability was stimulated through semantic and auditory facilitation. In these activities a word was presented, information related to its meaning was provided and its use was mentioned to facilitate the denomination and proper pronunciation. In the second stage, we worked with the increase of active vocabulary and the construction of simple sentences. In the third stage, the goal was to refine the point and mode of articulation, re-establish the fluency of the language and rehabilitate the grammatical structure. Finally, in the fourth stage the activities were aimed to facilitate the transition from automatic to spontaneous language.

Table 1 A rehabilitation program on two types of aphasia.

Stage	Broca´s aphasia	Conduction aphasia
Preliminary	General unlocking of the articulatory mechanism	Disinhibition of spontaneous articulatory processes
Stage 1	Restoration of the active phonation of individual words	Rehabilitate the phonation of the word through auditory and semantic stimulation
Stage 2	Overcome agrammatism	Rehabilitation of the active lexical flow based on the rehabilitated passive vocabulary and the unblocked common language
Stage 3	Overcoming perseverations, restoration of language fluency and rehabilitation of grammatical structure	Articulatory sound analysis of the elements that compose the word
Stage 4	Transition from automatic to spontaneous language.	Rehabilitation of the kinesthetic forms of the articulation to carry out the transition from the dissociation of the sonic-literal elements

Results

The diagnostic evaluation and the evaluation held after the intervention were performed with the Integrated Program of Neuropsychological Exploration Test Barcelona.[9] The results showed the decrease in motor perseverations and a rearrangement in the point and mode of articulation. A substantial improvement is seen at the different language levels (Table 2). Improved automatic language fluency. The phonoarticulatory capacity stabilized and the perseverations decreased, with this the repetition capacity increased. On the other hand, there was an increase in access to lexical labeling, which allowed denomination ability to also improve. Finally, the decrease in perseverations, the improvement in prosody and the increase in the informative content of the speech indicate that spontaneous language improved. This allowed the patient to be independent in activities of daily living, interacting with his family and in social life.

Table 2 The comparison of the initial evaluation and the evaluation after the rehabilitation program is presented.

Domain	Chores	PRE	POST	Semiology
Automatic language	direct series	0	2	Fluency improves, perservations decrease, articulatory search to a lesser extent.
	named plugin	4	3	
	Total	4	5	
Repetition	Orophonatory praxis	8	13	
	syllable repetition	2	2	
	logotomes	0	0	Increases phonoarticulatory capacity.
	minimum pairs	0	3	Decrease in perseverations and simplifications.
	Words	0	2	Reduction of contamination.
	Phrases	0	0	
	Total	10	10	
Denomination	Images	0	5	It improves access to lexical label, decreases active articulatory search, simplifications and increases responses in the form of semantic paraphasias.
	Objects	1	1	
	body pair	0	2	
	Answers naming	4	1	
	Total	5	9	
Spontaneous speach	Conversation-narration	3	5	Decreases perseverations, improves rhythm and informative content, even with difficulty in fluency.
	thematic narration	0	1	
	Description	0	0	
	Total	3	6	

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Discussion

The relevant variables in this case are associated with the large area of the lesion, the beginning of the rehabilitation program two years after the infarction, the high restriction of language, and the variables of the patient. Neuropsychological rehabilitation starts from the dynamic and systemic brain organization that allows access to the formation of new functional systems through the stimulation of intact afferents and transfer impaired functions to undamaged brain areas[8]. In the case presented, a liberation of language and a more precise articulation have been achieved. This has been confirmed in the evaluation carried out after the intervention.

A fundamental goal of rehabilitation is not only to rehabilitate the altered cognitive process, but also to create the necessary conditions for the reintegration of the patient in their social, work, and recreational activities.

Beyond the quantitative results, the patient in the case presented had the opportunity to interact with greater confidence in his medical consultations and provide his personal data, greet whoever he meets, call his relatives by name, make jokes with his children, and generate short phrases that allow him to interact in social meetings. In this way, it was possible to transform the patient's conditions, improve their quality of life and, indirectly, of his family.[7]

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Conflict of interests

The author declares that there are no conflicts of interest.

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