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Case reports

Effect of word retrieval therapy on a patient with expressive aphasia: a case report

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ABSTRACT

To verify the effect of word retrieval therapy on a patient with expressive aphasia. A forty-seven year-old, male, with 8 years of schooling, with complaints about not saying words after two ischemic stroke on the left hemisphere, participated in this study. The Montreal-Toulouse-Language Assessment Battery (MTL-BR), Brief Neuropsychological Assessment Instrument (NEUPSILIN-Af), Mini-Mental State Examination (MMSE) and Functional Assessment Communication Skills scale (ASHA-FACS) were used pre- and post-therapy. A baseline test with 50 words, 25 nouns and 25 verbs was applied to obtain data regarding naming ability. The sessions occurred twice a week, for 50 minutes. The intervention was based on a set of 25 images of nouns and verbs, in oral and written modalities during six sessions, for each category. On the three final sessions, 10 figures of nouns and 10 figures of verbs were added in sentences. In the post-therapy, the final baseline showed an increase in vocabulary of nouns and verbs. In the pos-intervention evaluation, the patient had an improvement in some tasks of MTL-BR battery, NEUPSILIN-Af tasks. Improvement in the social communication and daily planning aspects were reported in the ASHA-FACS. In conclusion, the word retrieval therapy was effective in this case, because there was an increase of the vocabulary and improvement in several linguistic, communicative and cognitive aspects.

Keywords: Aphasia; Language; Adult; Stroke; Neuropsychological Rehabilitation

INTRODUCTION

Worldwide, stroke affects about 15 million people, and approximately 30% of survivors have aphasia[1], which is the result of an acquired focal neurological lesion that occurs in the dominant hemisphere for language (usually the left hemisphere) and affects language skills (e.g., word retrieval, syntactic production, verbal and/or written comprehension) and, in some cases, a person's cognitive skills[1]. Aphasia may impact communicative functioning and, consequently, a person's performance of daily activities[1,2].

There are different types of aphasia, which are classified didactically and classically by their manifestations into: fluent aphasias (receptive) and non-fluent aphasias (expressive). Among fluent aphasias, there are Wernicke's, sensory transcortical, conduction and anomic aphasias. Non-fluent aphasias include Broca's, motor transcortical, mixed and global aphasias. However, in clinical practice, many patients do not fit into any of these types[3] and are classified according to their performance in language skills. This study will report a case of non-fluent (expressive) aphasia.

In expressive aphasias, fluency is usually impaired by the presence of anomies, phonemic, phonetic paraphrasias, agramatism, slow speech, prosody alteration, difficulty in understanding complex sentences and even mutism[3]. When these manifestations are detected, speech-language intervention is required as soon as possible[4]. Even in chronic cases, speech and language rehabilitation is important, since the process of cerebral neuroplasticity does not stop after neurological injury, which allows some brain functions affected by the lesion to be restored[5].

Intervention should be preceded by a careful assessment that takes into consideration patients' clinical and personal history, their needs and the needs of their families and caregivers[6]. In addition, standardized assessment instruments are essential to check both preserved and impaired language and cognitive skills[7].

In the literature, there are different assessment methods to be used before therapeutic intervention in aphasic conditions. One example is the Montreal-Toulouse Language Assessment Battery (MTL-BR)[8] is particularly suitable for cases of language disorders. Another example is the Brief Neuropsychological Assessment Instrument (NEUPSILIN[9]) was adapted for expressive aphasics - NEUPSILIN-Af[10], precisely because of the need to evaluate other cognitive functions that may be affected in these cases. Both instruments were used in this study, in addition to the Functional Assessment Communication Skills Scale (ASHA-FACS) and the Mini Mental State Examination (MMSE), in order to combine formal test measures with communicative and social skills with a view to determining the effect of the proposed intervention. In addition, studies that analyze not only language but also cognitive abilities of aphasic individuals, are also important because cognitive improvement as a whole results in direct benefits in the quality of life of patients and their families, thus providing them with better socialization opportunities.

In this study, the word retrieval approach was used because it is suitable for all types of aphasia, especially expressive aphasia, because of the presence of anomie. In this kind of intervention, semantic and phonological hierarchical clues are used to stimulate the recovery of verbs and objects[11]. Although this approach has been long used, it is still poorly studied in Brazil. The word retrieval approach is capable of generating wide benefits in the ability to recover words, not only those stimulated in the clinic, but also in other communicative contexts[12]. Such intervention uses auditory, visual, motor, mnemonic and attentional stimulation strategies capable of contributing to linguistic, cognitive and social advances.

The word retrieval therapy is effective in most articles found in the literature[13-15]; it brings substantial benefits, especially in picture naming, and also improves speech and untreated words. In the study of Kendall et al.[15], eight aphasics participated in this type of intervention that used nouns distributed into six categories (clothes, body parts, household items, animals, transport and school). The pictures were presented to the participants, who had to name them. If they failed, semantic, phonological, repetition and spelling cues were provided. All participants had significant improvement, which remained in five patients after three months without intervention. Another study[13] with three participants with different types of aphasia showed that word retrieval therapy was more effective in non-fluent patients, and there is an increase in the number of correctly named items. This study used both phonological and semantic clues. Although those studies presented important results for aphasiology clinic, they were performed with few patients who were they were not exposed to writing, as in the present study.

The hypothesis of this study is that the word recovery therapy will assist not only in oral naming of nouns and verbs[13-15], but also speech, and oral and written

comprehension. Vocabulary improvement may help in syntax and language construction. It is also expected to improve cognitive domains such as memory and attention, because patients should pay attention to what is requested and functions of the worked figures, for example. Thus, this research aims to check the effects of the therapeutic method of word retrieval in a case of expressive aphasia.

CASE REPORT

This study was previously approved by the Research Ethics Committee (CEP) of the Universidade Federal de Santa Maria under number 046225. It met the Institutional Research Ethics Criteria, according to Resolution n° 466/12 of the National Health Council. The participant signed an Informed Consent Form (ICF). He was then, a 47-year-old, right-handed male with eight years of schooling (complete elementary school). He worked in a public company performing office tasks. However, since he had brain injury, he started receiving social security benefit. According to his medical record, the patient had two ischemic strokes on the left hemisphere: one in June, and another in July of 2013. Importantly, the imaging studies performed at the time of his injury were not found, but, only blood tests whose results were considered normal by the doctor.

The participant started speech therapy in June 2017 (four years after the injury event), accompanied by his sister. He complained that he "could not speak a few words", which made social interaction very difficult for him. When asked about his memory, he pointed to his head and said that the words were there but he could not articulate them. However, he said that he understood everything he listened to, but the same did not happen with writing, because he could not understand what he read. Soon after the neurological episode, he could not speak a word and he had to relearn the "letters" again over time, that is, relearn to speak. After the stroke, he had motor problems and could not write with his right hand, so he adapted his writing by using his left hand. He denies having had previous speech therapy.

Since the stroke episode, he has been having greater motor difficulty on the right side of the body, which is affecting his walking and writing. Physiotherapy was performed shortly after hospital discharge for three months. His is hypertensive and was a smoker before the stroke. He currently takes the medicines Enalapril Maleate, Acetylsalicylic Acid and Varfarina (anticoagulant).

The inclusion criteria of this research were: presenting predominantly expressive aphasia resulting from stroke; being a monolingual speaker of Brazilian Portuguese; being right-handed, according to the Edinburgh Inventory[16] present in the Sociocultural and Health Aspects Questionnaire for stroke patients[17]; not having sensory disturbances (visual and/or hearing), or, if present, being corrected (by wearing glasses and / or hearing aids); absence of current or previous history of psychoactive substance abuse[17]; having more than 5 years of education, as surveyed through the Sociocultural and Health Aspects Questionnaire for stroke patients[17]; not having performed speech therapy before.

Exclusion criteria were: presenting receptive aphasia, characterized by difficulty in speech comprehension, diagnosed by a speech therapist with experience in aphasia evaluation; not presenting anomie; having any degenerative neurological disorders, traumatic brain injury or psychological disorders, less than six months after injury.

Pre and post intervention evaluations

Firstly, an initial interview was conducted with the participant and his family member, and the Sociocultural and Health Aspects Questionnaire for stroke patients[17] was applied to assess sociodemographic and clinical variables. This questionnaire was used to characterize him.

Subsequently, the following instruments were administered:

- Montreal-Toulouse Language Assessment Battery - MTL-BR[8], which uses 22 tasks to assess the linguistic components involved in communication, comprehension and oral expression (words, phrases, text and speech), reading (words, phrases and texts), writing (words, phrases, and speech), repetition, naming, praxis and calculus;
- Brief Neuropsychological Assessment Instrument - NEUPSLIN[9], adapted version[10] for expressive aphasia. It consists of an abbreviated examination battery to provide a quantitative and qualitative neuropsychological profile of eight major neuropsychological functions - Temporal-Spatial Orientation, Sustained Attention (auditory), Perception (visual), Memory (Working, Episodic-Semantic and Prospective), Arithmetic Abilities, Language (oral and written), Motor Abilities (ideomotor, constructive and reflective) and Executive Functions (simple problem solving and

phonemic verbal fluency). This version has been applied as it provides verbal and motor response options that are interpreted in the same way, that is, they receive the same score regardless of type of response.

- Mini Mental State Examination (MMSE)[18], which aims to assess cognitive impairment in adults and identify signs of dementia in patients over 60 years. Therefore, a score lower than 23 points is used as an indication of dementia for individuals with 6 to 11 years of schooling[19].
- Functional Assessment Communication Skills Scale (ASHA-FACS)[20]. This scale was used to complement traditional quantitative and qualitative assessments of speech, language and cognitive deficits by providing information on the effect of such deficits on the communicative context of everyday life.

The pre and post-intervention evaluator was a speech therapist with 10 years of experience in aphasic assessment. The speech-language intervention was performed by another speech-language pathologist. The evaluations were performed in a quiet room for 60 minutes, divided into 3 sessions.

Initially, the first author of this work conducted a baseline assessment with pictures of 25 nouns and 25 verbs from the Object and Action Naming Battery[21]. This battery checks patients' naming ability. The patients received 1 point for each correct answer. The patients were selected according to their daily lifestyle.

The data were analyzed by calculating the z-score based on the means and standard deviations of the corresponding normative group for age and schooling of theMTL-BR[8] and NEUPSLIN-Af[10] instruments. Deficits were considered as such when the value was ≤-1.50 according to the normative group data. In addition, subjective and qualitative data were analyzed using the responses of patients and their family (ASHA-FACS)[20], as well as the percentage of correct answers provided in the baseline assessment. The images used in the baseline test were the same ones used in the final assessment. After evaluations, the following speech-language diagnosis was established: "Predominantly expressive aphasia".

Intervention

The sessions lasted 50 minutes each in a quiet and ventilated room. The speech therapy took place twice a week, in a total of 15 sessions (2 months).

The therapeutic model proposed by Hillis[11] was used for intervention. Fifty color pictures were used at the first part of the intervention. The pictures corresponded to different semantic categories and were presented in digital (HP Mini 210 computer) and printed (material sold by Super Duper) form. The pictures were presented to the patient with the questions: "What is this?", "What is the person doing?" or "What is going on?" As suggested by Hillis's[11] approach.

The patient should respond by naming or describing what he saw in the picture. In each mispronounced word, the clinician provided phonemic and / or semantic hierarchical clues about the stimulus (e.g., for the BP target word *cozinha,* "kitchen"- phonemic clue: "begins with [ko]"; semantic clue: where we prepare meals / food) to facilitate lexical access and correct production. If he still could not evoke the word, the clinician elicited it and he should repeat it by imitation, trying his best production. The clinician stimulated memory retention by exploring information such as the meaning of the words, the location of objects, etc. In addition, the meaning of word, function, etc. was worked with through writing. Some examples of actions presented in the images were brushing, changing the light bulb and playing ball. The objects included kitchen utensils, tools, household furniture and toiletries, for example.

In the first six sessions, the clinician used a set of 25 images for nouns and explored them in both oral and written form. In the following six sessions, the test was conducted with 25 verbs that the patient was familiar with. In the final three sessions, 10 nouns and 10 verbs were included in the sentences. Thus, at the word level, 4 pictures were presented per session and 5 pictures (for nouns and verbs) were presented in the last session. At the sentence level, 6 sentences were used in two sessions and 8 were used in the last session. A larger number of words was used in the last session because the patient had already had more training than in the first sessions, which led to better production and verbal fluency.

During the sessions, each picture was explored for approximately 10 minutes, and after the patient had performed his best pronunciation, another word was used. In the last 10 minutes of the session, a screening was performed with the 4 pictures used previously to check if the patient had memorized them. If the patient could not recall the words, they were written in his notebook and the respective pictures were glued on so that he could repeat the same task at home. In the next session, the same words were revisited and another group of words was explored right after that.

The strategy of stimuli presentation was the same in all sessions, and the stimuli were replaced after the patient had reached 90% accuracy in picture naming - both orally and in writing. Thus, the patient was supposed to produce 90% of correct naming in each category to insert the word (pictures) into sentences[11]. Once he had achieved word-level accuracy, he was encouraged to make sentences using the target pictures in the last sessions. Thus, upon completion of the work at sentence level, using the same analysis made for the words produced, the therapeutic process based on the word retrieval approach was finished. It is noteworthy that, in all sessions, he received guidance to continue linguistic stimulation at home through dialogue, reading and writing.

RESULTS

In the pre-intervention baseline[21]the patient correctly named 32% (eight) figures of nouns and 0% verb. Post intervention correctly named 53.28% (13) nouns and 32% (13) verbs.

In the pre-intervention qualitative assessment of the MTL-BR[8] the patient presented linguistic errors such as graphemic and literal paragraphs, phonemic, phonetic, formal, semantic and verbal paraphasias, anomies, circumlocchi, neologisms, agramatisms and gestures. In the post-intervention evaluation the same processes remained, but also presented paraphrases and perseverations.

Table 1 shows quantitative data of the MTL-BR Battery[8] pre and post intervention.

Table 1. Quantitative data from the Montreal-Toulouse Language Assessment Battery pre- and post-intervention

Tasks	Pre-intervention			Post-intervention		
	Raw score	Z-score	Classification	Raw score	Z-score	Classification
Directed interview	26/26	0.27	Average	26/26	0.27	Average
Automatic speech – form	2/6	-9.27	Deficit	2/6	-9.27	Deficit
Automatic speech – content	3/6	-9.67	Deficit	3/6	-9.67	Deficit
Oralcomprehension – words	4/5	-2.18	Deficit	4/5	-2.18	Deficit
Oralcomprehension – phrases	10/14	-2.06	Deficit	11/14	-1.33	Average
Oral comprehension– total	14/19	-2.29	Deficit	15/19	-1.84	Deficit
Oral narrative – total words	26	-0.99	Average	26	-0.99	Average
Oral narrative – total information unit	4/10	-0.88	Average	5/10	-0.46	Average
Oral narrative – total scenes	0/3	-1.91	Deficit	1/3	-0.92	Average
Written comprehension– words	5/5	0.17	Average	5/5	0.17	Average
Written comprehension– phrases	7/8	-0.97	Average	7/8	-0.97	Average
Written comprehension– total	12/13	-0.78	Average	12/13	-0.78	Average
Copy	8/8	0.30	Average	8/8	-0.30	Average
Dictation	4/22	-6.39	Deficit	6/22	-5.55	Deficit
Repetition – words	1/11	-17.50	Deficit	4/11	-12.14	Deficit
Repetition – phrases	2/22	-46.21	Deficit	5/22	-39.23	Deficit
Repetition – total	3/33	-41.21	Deficit	9/33	-32.87	Deficit
Reading – words	4/12	-6.22	Deficit	6/12	-4.45	Deficit
Reading – phrases	7/21	-55.39	Deficit	17/21	-22.05	Deficit
Reading – total	11/33	-18.42	Deficit	23/33	-7.89	Deficit
Semantic verbal fluency	6	-2.30	Deficit	12	-1.19	Average
Non verbal praxis	24/24	-*	Average	24/24	-*	Average
Naming – substantives	17/24	-6.30	Deficit	19/24	-4.30	Deficit
Naming – verbs	4/6	-1.41	Average	6/6	-0.60	Average
Naming – total	21/30	-5.73	Deficit	25/30	-2.88	Deficit
Object Manipulation	15/16	-2.58	Deficit	16/16	0.19	Average
Phonemic verbal fluency	2	-1.88	Deficit	3	-1.72	Deficit
Body part recognition and left-right orientation – total	8	0.18	Average	8	0.18	Average
Written naming – substantives	4/24	-8.14	Deficit	7/24	-6.68	Deficit
Written naming – verbs	0/6	-6.43	Deficit	2/6	-4.10	Deficit
Written naming – total	4/30	-8.30	Deficit	9/30	-3.35	Deficit
Oral text comprehension	7/9	0.14	Average	6/9	-0.29	Average
Number dictation	3/6	-9.67	Deficit	4/6	-6.33	Deficit
Number reading	4/6	-5.34	Deficit	4/6	-5.34	Deficit
Written narrative– total words	8	-1.23	Average	12	-1.02	Average
Written narrative– total information unit	2/10	-1.29	Average	4/10	-0.55	Average
Written narrative– total scenes	0/3	-1.87	Deficit	1/3	-0.77	Average
Written text comprehension	5/9	-1.76	Deficit	7/9	-4.70	Deficit
Mental calculation	3/6	-1.18	Average	4/6	-0.32	Average
Written calculation	6/6	0.93	Average	5/6	0.36	Average
Calculation – total	9/12	0.10	Average	9/12	0.11	Average

* Boxes filled with a dash indicate that, for that task the occurrence of errors in the normative sample was non-existent, that is, all participants got all the items right. Since the standard deviation is zero, the calculation cannot be performed.

According to Table 1 in the Oral Comprehension (Phrases), Oral and Written Narrative (total scenes elements), Semantic Verbal Fluency and Object Manipulation tasks he had deficits in the pre-intervention evaluation and improved to average in the post-intervention evaluation. The remaining tasks that were average and those with deficits in pre-intervention maintained the same level in the post-therapy evaluation. However, there was a decrease in the z-score values of these tasks.

Table 2 presents the quantitative data of the NEUPSILIN-Af[10] pre and post intervention.

Table 2. Quantitative data from NEUPSILIN-Af pre and post-intervention

Tasks	Pre-intervention			Post-intervention		
	Raw score	z score	Classification	Raw score	z score	Classification
Spatial orientation	4/4	0.13	Average	4/4	0.13	Average
Temporal orientation	3/4	-1.43	Average	4/4	0.45	Average
Temporal-spatial orientation (total)	7/8	-1.26	Average	8/8	0.47	Average
Attention (reverse counting)	20/20	0.33	Average	20/20	0.33	Average
Attention (repeat digit sequence)	2/7	-0.61	Average	3/7	-0.11	Average
Attention (total)	22/27	-0.00	Average	23/27	0.23	Average
Perception (similarities and differences verification)	6/6	0.68	Average	6/6	0.68	Average
Perception (visual hemineglect)	1/1	-*	Average	1/1	-*	Average
Faces perception	2/3	-0.90	Average	1/3	-2.59	Deficit
Perception (faces recognition)	2/2	0.31	Average	2/2	0.31	Average
Perception (total)	11/12	0.21	Average	10/12	-0.57	Average
Working memory (reverse ordering digits)	2/10	-2.32	Deficit	2/10	-2.32	Deficit
Memory (words in sentences auditory span)	10/28	-0.55	Average	12/28	-0.08	Average
Working memory(total)	12/38	-1.27	Average	14/38	-0.89	Average
Verbal memory (immediate recall)	2/9	-1.85	Deficit	4/9	-0.31	Average
Verbal memory(delayed recall)	0/9	-1.07	Average	4/9	1.63	Average
Verbal memory (recognition)	16/22	1.76	Average	15/22	1.33	Average
Verbal E-S memory (total)	18/40	0.02	Average	23/40	1.26	Average
Semantic memory (long term)	5/5	0.28	Average	5/5	0.28	Average
Visual Memory (shortterm)	3/3	0.64	Average	2/3	-0.88	Average
Prospective memory (total)	2/2	0.80	Average	2/2	0.80	Average
Memory (total)	40/88	-0.81	Average	44/88	-0.22	Average
Arithmetic abilities	8/8	0.68	Average	6/8	-0.59	Average
Lgg (automatic)	2/4	0.13	Average	3/4	6.80	Average
Lgg (naming)	4/4	-*	Average	4/4	-*	Average
Lgg (repetition)	4/10	-12.0	Deficit	6/10	-7.83	Deficit
Lgg (comprehension)	3/3	0.43	Average	3/3	0.43	Average
Lgg (inferences)	2/3	-0.59	Average	3/3	1.05	Average
Oral lgg (total)	15/24	-5.21	Deficit	19/24	-1.67	Deficit
Lgg (reading)	4/12	-15.4	Deficit	8/12	-7.42	Deficit
Lgg (written comprehension)	2/3	-1.74	Deficit	3/3	0.43	Average
Lgg (spontaneous written)	2/2	0.71	Average	2/2	0.71	Average
Lgg (copy)	2/2	0.31	Average	2/2	0.31	Average
Lgg (dictation)	5/12	-4.09	Deficit	5/12	-4.09	Deficit
Written lgg (total)	15/31	-7.38	Deficit	19/31	-5.17	Deficit
Lgg (total)	30/55	-8.05	Deficit	38/55	-4.70	Deficit
Motor abilities(Ideomotor)	3/3	0.13	Average	3/3	0.13	Average
Motor abilities (constructional)	13/16	0.55	Average	13/16	0.55	Average
Motor abilities (reflexive)	2/3	-0.10	Average	2/3	-0.10	Average
Motor abilities (total)	18/22	0.49	Average	16/22	-0.26	Average
Problem solving (total)	1/2	-1.23	Average	2/2	0.55	Average
Phonemic verbal fluency (2min)	3	-2.28	Deficit	5	-1.77	Deficit

Note: Language (Lgg); Episodic-semantics (E-S)
* Boxes filled with a dash indicate that, for that task the occurrence of errors in the normative sample was non-existent, that is, all participants got all the items right. Since the standard deviation is zero, the calculation cannot be performed.

According to Table 2 in verbal memory (immediate recall) and Language (written comprehension) tasks he had deficits. In the post-therapy evaluation these tasks were on average. Tasks that he had deficits in the initial assessment such as language (repetition, oral naming, reading aloud, dictation, total writing) and working memory (reverse digit ordering) remained deficient in the reevaluation. Nevertheless, the z-score values showed reduction, with a decrease in the intensity of the present deficit, but in the Face Perception task there was a worsening.In addition, although temporal-spatial orientation, attention, memory, language, and problem-solving tasks have the option of Oral Response (RO) or Motor Response (MRI), the patient had preference for oral responses.

Table 3 shows the quantitative data of the MMSE[18] pre and post-intervention.

Table 3. Quantitative data from Mini MentalStateExaminationpre e post-intervention

TASKS	PRE-INTERVENTION	POST-INTERVENTION
Orientation /10	10	10
Memory /3	2	2
Atention andCalculation /5	1	2
Evocation/3	0	1
Language/9	8	9

According to Table 3, the MMSE results improvement pos-intervention in language, attention and evocation tasks. The total score obtained was 21 pre-intervention and 24 in the reevaluation.

In the ASHA-FACS evaluationpre-intervention, in the Social Communication domain there was a maximum score, 7 (adequate performance, without assistance) for 16 items.The family member scored 6 points (needs minimal assistance) in the items 11 (understand two-way expressions), 12 (understand conversations in a noisy environment) and 19 (can keep up with the conversation when another changes the subject).In two items the family members scored5 points needs minimum to moderate assistance): 18 (changes the subject of the conversation) and 21 (corrects your communication errors). In the Basic Needs domain, the family member reported that he presents adequate performance for all presented items, without any help. Regarding the Reading, Writing and Numerical Concepts domain he's biggest difficulties are related to items 34 (fills short forms) and 35 (take notes). Finally, in the Daily Planning domain, she scored 6 in items 39 (Can he tell the time?) and 40 (dials numbers on the phone). However, item 42 (oriented by maps) was not observed by the informant and the others were adequate. In the reevaluation, in the Social Communication domain, only item 21 remained with minimal assistance. The Basic Needs remained adequate. In the f Reading, Writing and Numerical Concepts domain, items 34 and 35 still require minimal assistance. In Daily Planning domain, items 39, 40 and 42 also require minimal assistance.

According to reports of the patient and his sister at the end of the therapeutic process there were improvements in oral and written communication. Currently he is more motivated and socially inserted in the community, because he can more easily perform activities of daily living, such as shopping. These data were obtained by self-assessment of the patient, noting that it is more communicative, being able to maintain dialogue and be understood by people.

DISCUSSION

The results show improvement in several linguistic, communicative and cognitive aspects by using the word retrieval intervention approach in a single case, as expected in the rehabilitation of aphasias[5]. Therefore, one needs to understand the importance of cognitive processes for optimization of existing therapies and focus on the limitations of each individual's language[2].

Improved performance in the post-intervention baseline assessment confirms the results found in another study[13] in which the therapeutic model approached was effective in treating an individual with non-fluent aphasia. It enable improvement of the participant's naming ability, after his initial difficulties at the beginning of the intervention. In addition, this method

of intervention advocates generalization to untrained words, that is, words that were not directly stimulated are acquired together with those that were explored in the session[11], as found in the baseline.

Improvement was expected in the naming tasks of the MTL-BR Battery, because the main focus of therapy was word retrieval. However, there are few items in this task, and for compliance with the normative data of the battery, the assessment is allowed to make only one error. Thus, based on the z score, the assessment does not provide the verification of the real advances achieved by the patient, because it remained deficient even though the patient had correctly named 4 items after the assessment[8].

The same analysis should be performed using NEUPSILIN-Af[10], in which the naming task is applied according to normative data, as opposed to the results found in MTL-BR[8]. In this sense, the baseline provided data that complement such assessments and demonstrate a patient's evolution, although still insufficient as expected.

Tasks involving oral expression, such as oral expression and semantic verbal fluency, produced positive results at the end of the treatment. This is due to the focus of therapy, which enabled an increase in the patient's lexicon (Table 1).

Writing was very stimulated in therapy and contributed to the improvement of the results in the task of written narrative speech and written text comprehension, although this last task is still deficient according to the normative data (Table 1). Such results are due to the fact that writing was not the focus of the therapy, which did not involve text writing or text comprehension; anyway, the intervention contributed to gains in these aspects. This is due to the fact that speech and writing are directly related and important to the communicative process, since they can both mediate ideas[22].

In the pre-intervention stage, the patient could not form sentences and his speech was sometimes unintelligible; he had anomies and various language disorders. Such disorders increased after the intervention. This was due to an increase in the production of words (nouns and verbs) that had been previously suppressed. Still, more linguistic processes emerged in his speech. His syntax became more appropriate and, as a result, his speech became more fluent, characterizing improvement in these aspects despite his errors.

Prior to the therapeutic intervention, the patient's speech was inconsistent with long pauses and omissions of sounds and words, which made it difficult to understand the interlocutor. Discursive deficits are due to the lack of coherence in sentences, decreased amount of information in dialogue, difficulty in understanding inferences and difficulty in using clues in order to make the dialogue flow[23], and they should be taken into consideration in aphasic individuals.

In general, there were improvements not only in the patient's language, but also in other cognitive domains, mainly those related to memory. This can be observed in the NEUPSILIN-Af[10] (Table 2) and MMSE[18] (Table 3) responses. These results can be justified by the intervention method in which the patient evokes the target words orally and in written form and assigns meaning to them. This allows the retention of the word in memory[13]. In addition, it is known that MMSE is not an aphasic assessment as it requires expressive language. Post-intervention assessment confirms this as there have been improvements in different cognitive aspects.

The patient's poor performance in the NEUPSILIN-Af[10] face perception task may be due to the participant's fatigue or even demotivation during the re-assessment. However, he showed better performance in attentional tasks of NEUPSILIN-Af[10] and MMSE[18]. Attention is one of the primary cognitive mechanisms for learning and storing the information received[24], which positively contributes to therapeutic success.

The results of the ASHA-FACS[20] instrument improved because expressive language improved. The Social Communication and Daily Planning items had greater progress than calculations, reading and writing items. These results were found in the literature[25] in a study in which a patient with language impairment scored high on ASHA-FACS[20], more than would be expected for someone with such significant language impairment.

After treatment, the participant showed improvement in expressiveness. He improved in communication using correct words and phrases. In some moments, his syntax was limited because of the presence of agramatisms. These linguistic changes occur as a resource for the improvement of words, which were previously suppressed. In addition to these aspects, it should be noted that the time between the stroke episode and the beginning of therapy may have limited some gains, since injury time is one of the main influences on language progress[4].

Thus, the therapy using pictures representing nouns and verbs was able to increase the patient's vocabulary, which improved oral communication by making it more intelligible. These same benefits were found in a study[26] that investigated the effect of word retrieval therapy (verbs) through various levels of language production, using semantic characteristics and clues. The results showed significant gains in the naming of treated verbs and a lesser effect on untreated verbs, as well as favorable changes in verbs at sentence-level.

Despite the benefits found from the therapeutic method being used, this study had important limitations, since it had only one subject, thus, these results cannot be generalized.

FINAL CONSIDERATIONS

After the therapeutic intervention, there were linguistic and cognitive improvements in the case study, indicating that the treatment based on word retrieval was effective for this patient.

Since the start of the therapeutic process was delayed, the intervention lasted for a short period of time, and there was a lack of a therapeutic model that included all the deficient aspects, that is,a negative influence on the improvement of some language and cognitive processes, such as repetition, reading aloud, memory and written language.

Finally, we suggest that further research be conducted using this approach to reaffirm the benefits of its application to patients with expressive aphasia.

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