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AUDITORY OBJECTIVE MEASURES

Behavioral and electrophysiological auditory processing assessment in children after traumatic brain injury

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Abstract

This study was conducted with 10 individuals, aged between 6 and 18, who experienced moderate or severe brain injury, with the objective of characterizing their performance in behavioral and electrophysiological tests of central auditory processing. The results showed that children and adolescents who had suffered moderate to severe traumatic brain injury had electrophysiological and behavioral alterations in central auditory processing assessments. The electrophysiological evaluation revealed no difference between the right and left ears in terms of latency and amplitude of the studied components. Brainstem auditory evoked potentials were abnormal in most individuals, particularly with minor brainstem alterations, with greater latencies and amplitudes observed in long-latency auditory evoked responses to speech stimuli. The long-latency auditory evoked responses to tone bursts were within normal limits. Additionally, the behavioral assessment of central auditory processing revealed Central Auditory Processing Disorder in all the subjects studied.

Table 2: Summary Table of the Qualitative Analysis of the Electrophysiological Assessment

Indivíduo	BERA	LLAEP
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Legend: BERA: Brainstem Auditory Evoked Response; LLAEP: Long-latency Auditory Evoked Potentials

Table 1: Summary table of the qualitative analysis of the behavioral central auditory processing tests

Study group	SLT	SMTV	SMTNV	SWNT	PSI/SSI (-15)	SSW	DCVT	DPT	RGDT
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Legend: green = normal; red = abnormal; SLT: sound localization test; SMTV: sequential memory test for verbal sounds; SMTNV: sequential memory test for nonverbal sounds; SWNT: speech in white noise test; PSI: pediatric speech intelligibility; SSI: synthetic sentence identification; SSW: dichotic staggered spondaic word; DPT: duration pattern test; DCVT: dichotic consonant-vowel test; RGDT: random gap detection test.

Résultats

In the quantitative analysis of the electrophysiological evaluation, no statistically significant difference was observed between the ears in latencies and amplitudes of the potentials studied. In brainstem auditory evoked potentials, only the average wave and III were found to be altered. 40% of the participants showed low brainstem alteration in brainstem auditory evoked potentials.

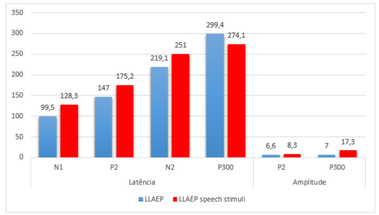

Figure 1: Comparison of latencies and amplitudes of LLAEP and LLAEP speech stimuli components

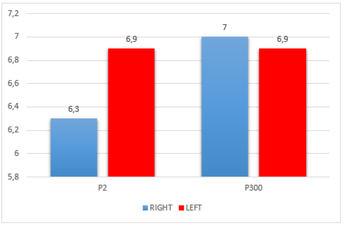

Figure 2: Amplitude of LLAEP components for each ear

The latencies of N1, P2, and N2 were statistically lower for long latency auditory evoked responses elicited by tone burst compared to speech stimuli, along with the amplitude of P2 and P3 components. 10% of the study participants showed changes in long latency auditory evoked response elicited with tone burst. In behavioral central auditory processing evaluation, several tests were altered in most individuals, including the speech in noise test, staggered spondaic words test, duration pattern test, and dichotic consonant-vowel test, all with 50% or more changes in the assessments.

Objectifs

The objective is to characterize the performance of children and adolescents who have experienced traumatic brain injury in behavioral and electrophysiological tests of central auditory processing.

Conclusion

The long-latency auditory evoked potential did not prove to be sensitive for the evaluated population when considering normal criteria. Among the applied electrophysiological tests, the brainstem auditory evoked potentials was the one that showed the most alterations in the studied population. It was found that all individuals presented with central auditory processing disorder evidenced in the behavioral evaluation, with a predominance of alterations in decoding, organization, and nonverbal processing.

Méthodes et Matériels

The study was conducted with ten audiologically normal individuals, aged between 6 and 18, who experienced moderate or severe brain injury. They underwent electrophysiological evaluation of auditory processing, including brainstem auditory evoked potentials, long latency auditory evoked response with tone burst and speech stimuli. Additionally, they underwent behavioral central auditory processing assessment with standardized tests selected according to their chronological age.

Références

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