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AUDITORY EXTINCTION AND DICHOTIC LISTENING CV TASK IN CEREBRAL INFARCTION

PRELIMINARY REPORT

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SUMMARY — Six stroke patients were studied using a dichotic listening CV task, 4 with left hemisphere infarction, 2 with right hemisphere infarction. It was observed a «lesion--effect», a shift of hemisphere prevalence to the side opposite a brain lesion. The authors suggest that the lesion-effect can be explained by the auditory extinction phenomenon at the linguistic level.

Estimulação dicótica CV em pacientes com acidente vascular cerebral: relato preliminar.

RESUMO — Foram estudados 6 pacientes com infarto cerebral mono-hemisférico utilizando o teste de estimulação dicótica consoante-vogal (CV) para estudo da preferência hemisférica a estímulos verbais. Observou-se em todos os casos lateralização para o hemisfério não comprometido, sugerindo a participação do fenômeno de extinção auditiva ao nível lingüístico.

Extinction to simultaneous stimuli is said to occur when one patient able to report a stimuli presented in isolation is unable to report the same stimuli presented simultaneously. In a brain injured person the extinction is related to the side opposite a brain lesion. Extinction can be found in varied sensory modalities, including visual, tactile and auditory. The first description of auditory extinction was made by Oppenheim [8] (1885) and later, Bender & Diamond [1] (1965) pointed out the relationship between extinction and hemisphere mechanism of perception. In classical terms auditory extinction was evaluated only by non-verbal sounds like snapping fingers. Recently, the auditory extinction has been studied in verbal task, mainly in dichotic listening test with verbal material [9]. Dichotic listening developed by Kimura [5] involves the simultaneous presentation of two different auditory stimuli to right and left ear. Normal right-handed subjects tend to report right ear stimuli more accurately. Probably it is due to the specialization of left hemisphere to process verbal information.

The aim of this study was to observe the relationship between hemisphere prevalence in dichotic listening CV and the side of a brain infarction in stroke patients.

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MATERIAL AND METHODS

Six right-handed patients with stroke were studied. The selection criteria included: (1) stroke episode at least 6 months before the study; (2) no hearing loss or differences between right and left ear detected by bone-conduction test and tonal audiometry; (3) more than 90% correct monoaural stimuli identification for each ear of the same stimuli used in dichotic listening task; (4) no aphasia signs.

The dichotic listening task was an adaptation to Portuguese language [7] for the Consonant-Vowel Test (CV) [10]. The procedure consists of exposition of 80 pairs of CV non-sense syllables presented simultaneously and bi-aural to both ear. The test was presented to the subjects from Akay CS 705 Recorder via 2 channels audiometer connected to TDH-39 earphones. The dichotic CV test was administered using 40 pairs of CV non-sense syllables (BA, DA, GA, CA, PA, TA) as stimuli with simultaneous onset of pairs. The test material was presented at 60 db to both ears. The presentation of the CV syllables includes all possible non-identical pairing of dichotic stimuli with an interstimulus interval of 6 seconds. Half way through the test, the 2 channels were reversed with respect to the ears via the audiometer. The patients say the syllable more clearly detected. Ear preference score (EPS) for dichotic listening were estimated using the method of Johnson et al [4]. The number of left ear correct responses was subtracted from the number of right ear correct responses, and the difference was divided by the total number of right ear plus left ear correct responses (EPS = R ear — L ear / R ear + L ear). The positive EPS reflects a right ear preference or a left hemisphere prevalence while a negative EPS reflects a left ear preference or a right hemisphere prevalence.

RESULTS

The ear preference score obtained in the six cases studied is shown in table 1.

Age (years)	Sex	Hemisphere infarction (CT scan)	EPS
60	F	RIGHT	1.00
63	F	RIGHT	0.80
54	M	LEFT	—0.35
55	F	LEFT	—0.20
63	F	LEFT	—0.40
60	M	LEFT	—0,06

Table 1 — Ear preference score × brain lesion side in the 6 patients.

The age ranged from 54 to 63 years with a mean of 59.1 years. Cerebral infarction was observed in 6 patients, 4 in left and 2 in right cerebral hemisphere. In 4 left hemisphere infarction patients we observed a right hemisphere prevalence (negative EPS) with a mean of 0.25. In 2 right hemisphere infaction patients we found a left hemisphere prevalence (positive EPS) with a mean of 0.9.

COMMENTS

A shift of hemisphere prevalence to the non-lesional hemisphere, previously called «lesion - effect»[11] can be explained by two ideas: (1) Structural — An adaptation of a non-lesional hemisphere to process a verbal stimuli. Johnson et al.[4] found a left ear preference in 20 aphasic patients using a CV dichotic listening test. The left ear advantage is interpreted as reflecting the superiority of the right hemisphere over the damaged left hemisphere in auditory verbal perception [2]. In our cases the adaptation transfer of function from the left to right hemisphere seems to be unlikely. The advanced age of non-aphasic patients studied do not support the neuronal plasticity process. (2) Perceptual — A shift of a perceptive or attentional process related to a interhemispheric mechanism.

Some authors [3,6] found a shift of speech perception in convergence areas lesions outside the primary sensory projection areas, which are thought to participate in a neural network of a lateral attention and extinction.

A verbal dichotic listening can be seen like a double stimulation test in auditory modality [9]. In fact we can suggest that the superiority of a non-lesional hemisphere to process a CV stimuli can be reflecting the auditory extinction phenomenon at the linguistic level.

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