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Volume 26, 1987 - Issue 4

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# Audiologic Diagnosis of Central versus Eighth Nerve and Cochlear Auditory Impairment

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Pages 209-226 | Received 05 May 1986, Accepted 06 Feb 1987, Published online: 03 Feb 2011

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## Abstract

122 subjects divided into four groups according to the site of lesion (cochlea, eighth nerve, brainstem and temporal lobe) were subjected to an audiometric test battery, including pure-tone sensitivity measures, recruitment testing, tone decay, Békésy audiometry, speech audiometry, stapedius reflex measures and auditory brainstem response (ABR) audiometry. The results were contrasted among the four groups by calculating several measures of test performance, including sensitivity, specificity, efficiency, A' (test performance) and plots on the receiver operating characteristic (ROC) space of pure positives versus false alarms. In the differential diagnosis between eighth nerve and cochlear site, the various measures did not rank the tests in the same order: (a) for efficiency: ABR, Békésy audiometry; (b) for A' (similarly to the analysis

into the ROC space): ABR, recruitment, Békésy, stapedius reflex, speech audiometry, tone decay. In distinguishing an eighth nerve from a brainstem site, it is important to consider amount of hearing loss, presence of tinnitus, abnormal tone decay and Békésy audiometry patterns. ABR adds significant diagnostic efficiency only when waves II, III and V are detectable: a prolonged I-II interpeak interval (IPI) and a normal III-V IPI are characteristic of the eighth nerve site. ABR gives good diagnostic support in the intrinsic brainstem lesions by suggesting changes in the generator sites of the component waves. The audiometric diagnosis of temporal lobe lesions involving the auditory cortex still relies upon speech audiometry: tests specifically designed for this purpose by Bocca and Calearo and by Jerger - i.e. the 'sensitized sentences' and the identification of synthetic sentences under ipsi- or contralateral competing message - are commendable for their sensitivity and efficiency in distinguishing brainstem from temporal lobe sites. In brainstem sites, the most affected ear is ipsilateral to the lesion for ABR, but contralateral for speech audiometry.

Key Words:

Sensori-neural auditory impairment

Battery approach

Test evaluation

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