Click vs CE-Chirp ABR in relation to pure tone thresholds in Adults with Normal Hearing and Sensorineural Hearing Loss

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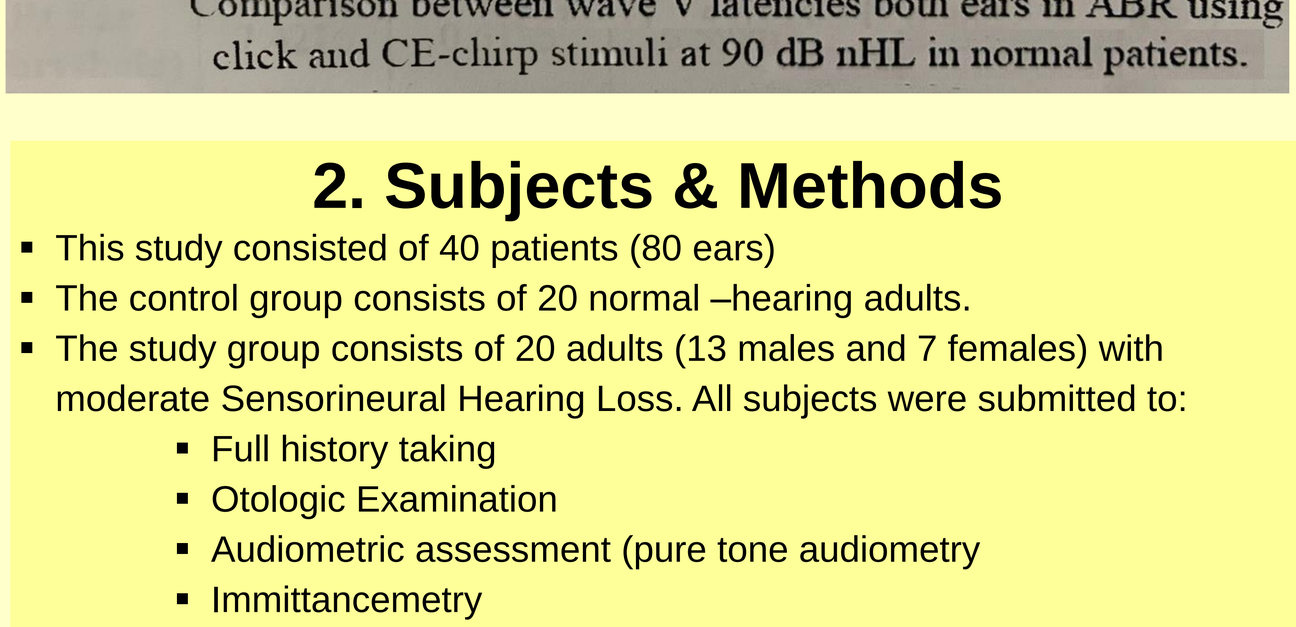
1. Introduction

- ABR (auditory brainstem response) represent the primary tool for both identification and diagnosis of hearing loss. ABRs are evoked potentials that appear between 2 and 12 milliseconds after auditory stimuli are delivered.
- Click-ABR is the most popular and widely used method for ABR recordings.
- The time interval for a sound wave to reach the cochlear apex is extended in Click ABR measurements.
- The peak point of the response appears milliseconds after the region of high frequency in a lower frequency area. As a result, basal membrane cells are not stimulated at the same time.
- Claus Elberling and his collaborators created the CE-Chirp stimulus to compensate for temporal dispersion in the cochlea due to travelling wave delay by aligning the arrival time of each frequency component in the stimulus to its place of maximum excitation along the basilar membrane.
- The difference between CE-Chirp and Click stimuli is due to the delivery times of components with low, moderate, and high frequencies, which allow for simultaneous stimulation of all frequency areas.

Aim:

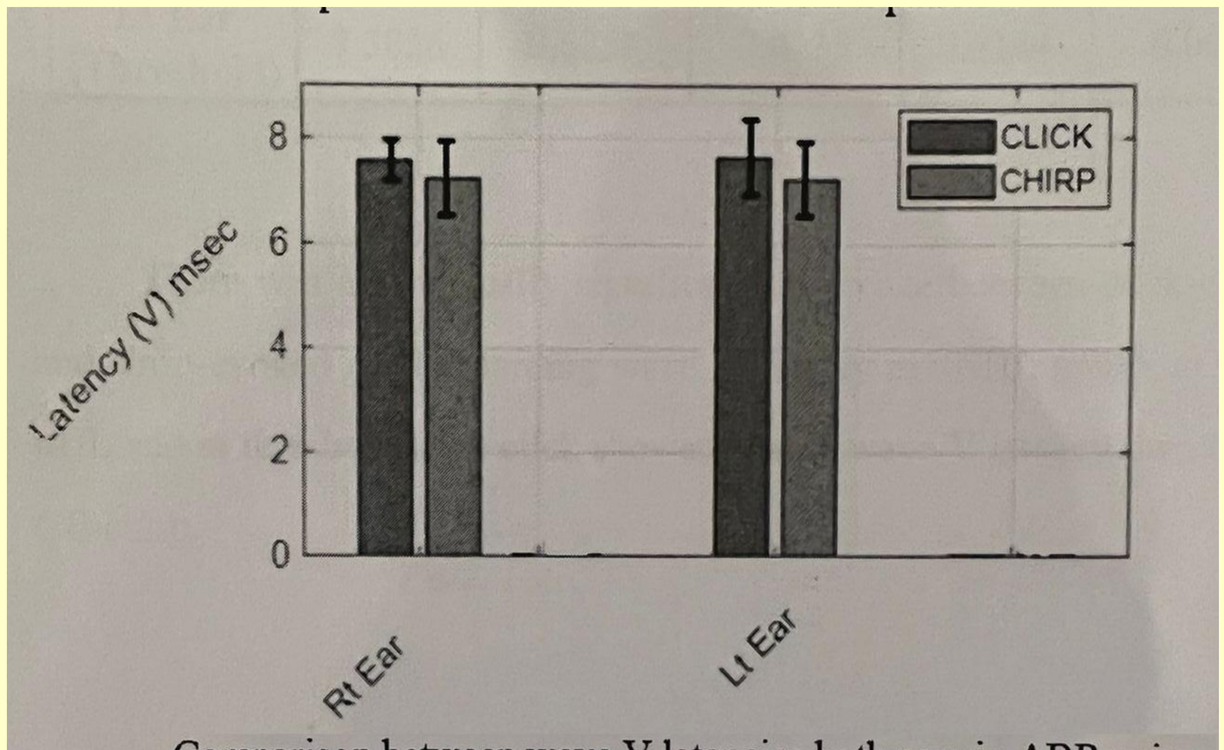
- To correlate thresholds obtained by click and CE-Chirp with the behavioral thresholds in normal hearing subjects and patients with moderate sensorineural hearing loss and to assess the effectiveness of chirp evoked ABR in predicting thresholds.



Comparison between wave V latencies both ears in ABR using click and CE-chirp stimuli at 90 dB nHL in normal patients.

2. Subjects & Methods

- This study consisted of 40 patients (80 ears)
- The control group consists of 20 normal –hearing adults.
- The study group consists of 20 adults (13 males and 7 females) with moderate Sensorineural Hearing Loss. All subjects were submitted to:
  - Full history taking
  - Otologic Examination
  - Audiometric assessment (pure tone audiometry
  - Immittancemetry
  - Auditory Brain Stem response using click and CE-Chirp stimuli.



Comparison between wave V latencies both ears in ABR using click and CE-chirp stimuli at threshold level in normal patients.

3. Results & Discussion

- In our study, procedural time of CE-Chirp ABR test was shorter than that of Click ABR test.
- The analysis of wave V latency in the control group with both click and CE-Chirp stimuli at intensity levels of 90 dBnHL and threshold level revealed a highly statistically significant shorter wave V latency caused by CE-Chirp stimuli compared to click stimuli.
- The average amplitudes of wave V with the CE-Chirp stimulus were significantly greater than those recorded with the click stimulus at all intensity levels (90dBnHL and threshold level).
- When we compared CE-Chirp ABR threshold values to Click ABR threshold values, we discovered that CE-Chirp ABR threshold values were closer to PTA 1, 2 KHz threshold values, whereas Click ABR threshold values were closer to 4 KHz behavioral threshold values.
- According to literature reviews, patients with normal hearing acuity were more frequently compared to CE-Chirp ABR and Click ABR methods.

4. Conclusions

- CE-Chirp ABR test was shorter than that of the Click ABR test.
- The CE-Chirp ABR threshold values were higher in both ears than the Click ABR threshold values.
- Finally, when evaluating patients with bilateral sensorineural hearing loss, we discovered that the CE-Chirp ABR method was superior to the Click ABR method.
- In normal hearing patients, CE-Chirp elicited larger responses than click stimuli at (90dB nHL) and at thresholds.
- At threshold, however, there was no difference between the two stimuli in the SNHL group.

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