

HOSTED BY



Contents lists available at ScienceDirect

Egyptian Journal of Ear, Nose, Throat and Allied Sciences

journal homepage: www.ejentas.com



Original article

Value of complex evoked auditory brainstem response in patients with post-stroke aphasia (prospective study)

S. Mourad^{a,*}, M. Abd Al-Ghaffar^a, Mohamed Al-Amir Bassiony^b, G. Fawzi^a^a Audiology Unit, E.N.T. Department, Faculty of Medicine, Sohag University, Egypt^b Neuro-psychiatric Department, Faculty of Medicine, Sohag University, Egypt

ARTICLE INFO

Article history:

Received 18 December 2016

Accepted 31 May 2017

Available online xxxxx

Keywords:

Complex-ABR

Aphasia

Stroke

ABSTRACT

Objective: To evaluate the perception of complex ABR (C-ABR) in aphasic patients and to compare it before and 3 months after management of stroke.

Methodology: A prospective study was conducted on 30 aphasic patients using C-ABR. The results were compared within 2 weeks post-stroke and 3 months after management. The results of aphasic patients were compared with normal subjects.

Results: The seven C-ABR waves regarding the onset (wave V and A), offset (peak O), transition (peak C) and frequency following responses (peak D, E and F) were identified in all participants. There was a statistically significant difference in C-ABR latencies between control and study group in the waves D, E, F and O, this means that aphasic patients exhibited abnormal neural synchrony affecting the source elements (fundamental frequency) (waves D, E, F and O) however there was no effect on the filter elements (transients).

Conclusion: Aphasic patients exhibited abnormal neural synchrony affecting the source elements (waves D, E, F and O) however there was no effect on the filter elements (transients).

© 2017 Egyptian Society of Ear, Nose, Throat and Allied Sciences. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Aphasia is an acquired language disorder in which there is an impairment of a language modality, it is not a result of sensory or motor deficit, a general intellectual deficit, confusion or psychiatric disorder. The disorder impairs the expression and understanding of language as well as reading and writing.⁵

According to **NIH stroke score**, post stroke language is classified into four grades. Grade 0: no aphasia; normal. Grade 1: mild to moderate aphasia, at which there is loss of fluency without significant loss of expression. Grade 2: severe aphasia at which all the communication through fragmentary expression. Grade 3: mute, global aphasia, there is no usable auditory or speech comprehension.

Kolb et al.⁹ classified aphasia into three categories: fluent, non fluent and pure aphasia. Fluent aphasia (called also receptive aphasia) is an impairment related mostly to reception of language. Speech is easy and fluent but there are difficulties related to the

input of language. Fluent aphasia is sub-classified into: wernicke's aphasia, Tran cortical sensory aphasia and conduction aphasia. Non fluent aphasia (also called expressive aphasia) is characterized by difficulties in articulation. Non fluent aphasia is sub-classified into: Broca's aphasia, Anomic and Global aphasia. Lastly pure aphasia is a selective impairment in reading, writing or the recognition of words; pure aphasia is sub-classified into pure alexia and agraphia. Global aphasia is the most common type in the acute period affecting about 25–32% of aphasic patients, while other classic types are seen less frequently.⁴

Skoe and Kraus¹⁸ reported that the auditory brainstem response (ABR) has proven to be a clinically useful tool for assessing neural function at the brainstem level and is most commonly elicited by clicks or tone-bursts. However, recent research has established that complex stimuli can also elicit the response such as Music, complex tones, and speech stimuli (e.g., /da/, /ba/, and /ga/). A speech stimulus is particularly useful, as it can provide clues as to how temporal and spectral features are preserved in the brainstem.

Greenberg³ was one of the first to adopt complex stimuli for recording auditory brain stem response. The complex ABR provides discrete representations of many aspects of the acoustic structure of speech, including separate neural representations of speech

Peer review under responsibility of Egyptian Society of Ear, Nose, Throat and Allied Sciences.

* Corresponding author.

E-mail address: salwa_mawgoud@yahoo.com (S. Mourad).

<https://doi.org/10.1016/j.ejenta.2017.05.006>

2090-0740/© 2017 Egyptian Society of Ear, Nose, Throat and Allied Sciences. Production and hosting by Elsevier B.V.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Please cite this article in press as: Mourad S., et al. Value of complex evoked auditory brainstem response in patients with post-stroke aphasia (prospective study). *Egypt J Ear Nose Throat Allied Sci* (2017), <https://doi.org/10.1016/j.ejenta.2017.05.006>

sound onset, phase-locking to the fundamental and formant frequencies and speech sound offset.¹⁶

Many studies were performed on auditory brainstem response to speech sounds in auditory specialization (e.g., musicians, native language speakers), auditory processing disorders, language-based learning impairments such as dyslexia, specific language impairment, autism, hearing loss, and age-related hearing loss.¹⁸

2. Objectives

To evaluate the perception of complex ABR in aphasic patients, to compare complex ABR perception among normal and aphasic patients and to compare speech perception in post stroke aphasic patients before and 3 months after management of stroke.

2.1. Methodology

1-Subjects: were divided into two groups:

(A) *Study group:* includes 30 post stroke aphasic patients (recent post stroke within the first 2 weeks) age range from 20 to 55 years. No history of hearing loss, ear disease, trauma, ototoxic drug intake or ear operations. Normal middle ear functions as evidenced by otological examination, tympanometry and acoustic reflex thresholds. Hearing threshold doesn't exceed 25 dBHL in the frequencies from 250 Hz to 8000 Hz. The patients were admitted at Sohag university hospital and were examined within the first two weeks of the stroke and follow-up was done 3 months after management. Patients did not receive language therapy.

(B) *Control group:* include 30 subjects with bilateral normal peripheral hearing with no neurological deficit.

2-Method:

A) *Equipments:* Sound treated room IAC model 1602, Pure tone audiometry: Madsen Orbiter 922, Immittance: Maico MI44, Evoked potentials system SMART intelligent hearing system.

B) *Procedure:* All subjects were subjected to:

1. *Informed written consent.*
2. *Full history taking.*
3. *Otological examination.*
4. *Basic audiological evaluation:* Pure tone audiometry including air and bone conduction, speech audiometry including: Speech Recognition Threshold (S.R.T) test: using Bisyllabic words for adults Soliman et al.²⁰ Word Discrimination score (W.D) test: using Arabic Phonetically-balanced adults (PBA) words Soliman,¹⁹ WIPI test in patients who couldn't perform Speech discrimination by PBA words. Immittance including tympanometry and acoustic reflex threshold.
5. *Neurological evaluation including NIH stroke scale.*
6. *Click evoked Auditory Brainstem Response:* to confirm presence of wave V.

Stimulus parameters: type: click stimulus, intensity: 90dBnHL, polarity: alternating, Presentation rate: of 13.1p/s, mode of delivery: stimuli were presented monaurally to the right ear via an ER3A- insert phone.

Recording parameters: electrode montage: The active electrode was placed on the high frontal (Fz), the ground electrode on the low frontal (FPz), the negative electrode on the right side and the reference electrode on the left side. Number of sweeps: 1024, filter: band passes of 100–1500 Hz, analysis period: 0–12 ms,

7. *Complex Auditory Brainstem Response (C-ABR):*

Recorded recently post stroke and 3 months after management.

Stimulus parameters: Type: 40-ms /da/ syllable it consists of onset noise burst during the first 10 ms and formant transition

between the consonant and a steady-state vowel. The stimulus was generated by Intelligent Hearing System Company and included in speech auditory brain response software. Intensity: 80 dB SPL, polarity: alternating, presentation rate: of 11p/s, mode of delivery: stimuli were presented monaurally to the right ear via an ER3A-insert phone.

Recording parameters: Electrode montage: The active electrode was placed on the high frontal (Fz), the ground electrode on the low frontal (FPz), the negative electrode on the right side and the reference electrode on the left side. According to Vander and Kathy²² there are no ear differences in complex ABR so the recordings were obtained from the right ear only. All electrodes were connected to the pre-amplifier of the Smart EP equipment. Number of sweeps: 4000, filter: band passes of 100–1500 Hz, analysis period: 75 ms including 15 ms pre-stimulus recording.

Response analysis: The response was identified by the presence of seven waves (V, A, C, D, E, F, O), wave V analogous to the wave V elicited by click stimuli, followed immediately by a negative trough (wave A). Following the onset response, a series of peaks (C–F) represent FFR. Offset response is represented by wave O. The wave's absolute latency, amplitude, VA amplitude, duration, area and also V-A slope all were measured. According to Wible et al.²³ V-A slope was mathematically calculated by dividing wave V-A amplitude by its duration.

3. Results

The control group consists of 30 subjects with age ranges from 20 to 50 years with the mean of 34.47, they were 17 males (56.7%) and 13 females (43.3%). The study group consists of 30 aphasic patients with age ranges from 25 to 50 years with the mean of 41.33, they were 21 males (70.0%) and 9 females (30.0%). The duration of aphasia in days ranges from two to seven days with the mean of 4.23.

3.1. Audiological findings

Pure tone audiometry: Study group: PTA was done only on six aphasic patients representing 20% of the whole study group; these patients were of motor type. They had bilateral normal hearing. While PTA in the control group was done to the whole subjects, and they had bilateral normal hearing.

Auditory brainstem Audiometry: ABR threshold: was done to the remaining aphasic patients who PTA couldn't be obtained. ABR at 88 dBnHL: was done to whole study and control groups to identify wave V. In click ABR, the absolute latencies of wave V were within normal values. There was no significant difference between the latency of wave V of click and C-ABR.

3.2. Follow up results

There were twelve (40%) patients that come for follow-up.

4. Discussion

In the current study, the age range was between 20 and 50 years in the control group with the mean age 34.47 years while the aphasic patients aged from 25 to 50 years; which was one of the selection criteria with the mean age of 41.33 years. In our study, males were more prevalent than females in the study group with a ratio of 70%:30%. This disagrees with²¹ who studied eighty aphasic patients, they found no gender difference in aphasic patients. The discrepancy between the two results may be attributed to the difference in the number of the both groups.

Download English Version:

<https://daneshyari.com/en/article/8805727>

Download Persian Version:

<https://daneshyari.com/article/8805727>

[Daneshyari.com](https://daneshyari.com)