CASE REPORT

The Clinical Usefulness of the Traditional Auropalpebral Reflex Test When Assessing a Mentally Challenged Hearing-impaired Adult

Mahamad Almyzan Awang[1], Rosdan Salim[2], Mohd Fadzil Nor Rashid[3], Wan Najibah Wan Mohamad[4], Marniza Omar[5], Mohd Normani Zakaria[6]

Received on: 03 November 2022; *Accepted on*: 28 May 2023; *Published on*: 16 August 2023

Abstract

Aim: This report highlights the usefulness of performing the traditional auropalpebral reflex (APR) test for hearing diagnosis in a difficult-to-test adult patient.

Background: Getting an accurate hearing diagnosis is the ultimate aim when assessing patients with hearing loss. Even though there are many sophisticated hearing tests available nowadays, the use of an old-fashioned hearing test is still beneficial.

Case description: Attempts were made to diagnose the hearing status of a mentally challenged 35-year-old man. Pure-tone audiometry (PTA) testing failed to provide reliable results as the patient was unable to understand even simple instructions. The APR test was carried out, and he was found to have at least bilateral severe hearing loss, consistent with the results of the auditory brainstem response (ABR) test.

Conclusion: Performing the traditional APR test is advantageous in clinical settings as it is simple to administer and able to estimate hearing levels in bilateral severe or profound hearing loss cases (particularly in situations where other audiological tests are not available).

Keywords: Auditory brainstem response, Auropalpebral reflex, Case report, Hearing loss, Pure-tone audiometry.

Otorhinolaryngology Clinics: An International Journal (2023): 10.5005/jp-journals-10003-1443

Introduction

In clinical settings, patients with hearing loss and related symptoms (such as vertigo and tinnitus) are assessed and treated appropriately by qualified clinical professionals such as otorhinolaryngologists and audiologists.[1–5] Hearing loss can be categorized into different severity levels (mild, moderate, severe, and profound) and has three types, that is, conductive hearing loss (CHL), sensorineural hearing loss (SNHL), and mixed hearing loss (MHL).[6]

Nowadays, in line with technological advancements, many subjective and objective hearing tests are available to assist clinical professionals when dealing with hearing-impaired patients. Subjective tests (in which full cooperation from the patients is required) such as distraction test, visual reinforcement audiometry (VRA), play audiometry, and pure-tone audiometry (PTA) are performed according to the patient's developmental age.[6,7] The commonly used objective audiological assessments include tympanometry, the acoustic reflex test, the otoacoustic emission (OAE) test, the auditory brainstem response (ABR) test, and the auditory steady-state response (ASSR) test.[8–12] These tests are useful to some extent as they do not require any behavioral responses from the patients.[6]

To achieve an accurate hearing diagnosis, it is common to have a combination of objective and subjective tests so that the respective results can be integrated accordingly.[6] The necessity to use different types of hearing assessments is dependent on many factors including age, attention span, understanding levels, and cooperation status of the patients.[6] Even though the emergence of more sophisticated hearing tests is notably beneficial, a simple traditional hearing assessment such as the auropalpebral reflex (APR) test may be "abandoned" and not be used widely in clinical settings nowadays. In this report, we highlight the clinical usefulness of the APR test for hearing diagnosis when testing a difficult-to-test hearing-impaired adult.

[1,3,4,6]Department of Audiology, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

[2]Department of Otorhinolaryngology, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

[5]Department of Centre for Disability and Special Needs Studies, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia

Corresponding Author: Mohd Normani Zakaria, Department of Audiology, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia, e-mail: mdnorman@usm.my

How to cite this article: Awang MA, Salim R, Nor Rashid MF, *et al*. The Clinical Usefulness of the Traditional Auropalpebral Reflex Test When Assessing a Mentally Challenged Hearing-impaired Adult. Int J Otorhinolaryngol Clin 2023;15(1):48–50.

Source of support: Nil

Conflict of interest: None

Case Description

A mentally challenged 35-year-old man was referred to the Audiology Clinic of the Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia for hearing assessments by an otorhinolaryngology (ORL) doctor. According to the case file, he was seen by the ORL doctor in 2017 for the treatment of bilateral canal cholesteatoma. Prior to that, he has a history of ear discharge and underwent close treatments since he was 11 years of age. His hearing has been

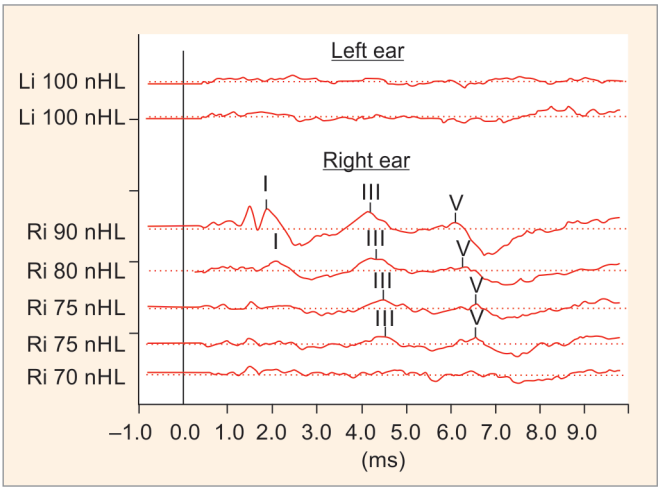

Fig. 1: The ABR waveforms from the patient based on the recommended test protocol

progressively worsening since then. The ear discharge was also accompanied by mucous discharge and foul smell. Despite receiving frequent treatments provided by the respective ORL doctor, there was no complete diagnosis of his hearing status. The PTA testing was attempted several times in the previous sessions, but the findings were inconsistent and incomplete.

On current session, the otoscopic examination showed a clear and dry ear canal with a perforated tympanic membrane (TM) for both ears. In line with this, the tympanometry showed a type B tympanogram (flat line) with a high ear canal volume (ECV = 2.5 cm^3) bilaterally (suggestive of perforated TMs). The tympanometry results were obtained with a 226 Hz middle ear analyzer (AT235H, Interacoustics, Denmark). The acoustic reflex test was attempted but an airtight seal could not be achieved (due to perforated TMs).

The PTA testing was then carried out, but any reliable results could not be established as the man was unable to follow instructions well and produced a lot of false positive responses. A calibrated two-channel audiometer (GSI 61; Grason–Stadler, Inc., USA) was used for the PTA procedure. Subsequently, the distortion product otoacoustic emission (DPOAE) test was carried out, and "refer" results were obtained (at frequencies of 1, 2, 3, 4, and 5 kHz) for both ears. These abnormal results could be due to the presence of conductive pathology (perforated TMs) or poor outer hair functions. The portable OtoRead™ device (Interacoustics, Denmark) was used to record the OAE results.

It was then decided to proceed with the APR test using a loud /ba/ (live voice) sound. While having him sitting on a provided chair, the /ba/ sound was presented by the tester from behind (within a 1-m distance). Interestingly, no behavioral response was observed from him upon the presentation of the /ba/ sound at an intensity level of 105 dBA (measured with a calibrated sound level meter). This suggests that the patient would have at least severe hearing loss bilaterally.

To estimate his hearing thresholds objectively, the ABR test (with click stimulation) was subsequently conducted. A two-channel Biologic Navigator Pro system (Natus Medical, Inc., Mundelein, USA) was used to measure the ABR waveforms from this patient based on the recommended test protocol.[6] As illustrated in Figure 1, a clear wave V was still sighted at 75 dB nHL for the right ear. Conversely, no identifiable ABR peaks were noted at 100 dB nHL for the left ear. Based on the ABR results, at high frequencies, he was diagnosed to have severe hearing loss in the right ear and profound hearing loss in the left ear. It is worth noting that an attempt was made to record ABR waveforms using a 500-Hz tone burst stimulus, but the patient refused to cooperate further.

Discussion

Generally, diagnosing the hearing status of adult patients is supposed to be straightforward and uncomplicated. Typically, PTA testing is widely used for this purpose as it can provide both the severity of hearing loss and the type of hearing loss.[1,7] Having an accurate hearing diagnosis is undoubtedly imperative so that appropriate treatment can take place in a timely manner. In this report, since the patient was unable to understand the instructions given, complete and reliable PTA results could not be obtained (on many visits). Since the PTA testing is a subjective hearing assessment, cooperation from the patient is highly required. In cases where the patients are not able to provide reliable responses, the PTA results should be ascertained with other tests, particularly, the objective hearing assessments.[6,9,10]

Due to questionable PTA results for this patient, the results of other audiological tests were indeed crucial. Information from other assessments (type B tympanogram and abnormal DPOAE results), as well as the history of cholesteatoma, implies the presence of either CHL or MHL (for each ear). Since he had perforated TMs, the acoustic reflex testing could not be performed due to the inability to obtain a good probe seal. In line with this, many studies have reported that any conductive pathologies would compromise the stapedius muscle contraction.[6,13,14]

Having an ABR test is useful in clinical settings due to its objective nature. In fact, both the severity of hearing loss and the type of hearing loss can be estimated with the ABR test.[6] In this case, the ABR testing was conducted to estimate the patient's hearing level, as well as the possible type of hearing loss. For the right ear, based on the poor morphology of the waveforms (even at suprathreshold levels) (Figure 1), the type of hearing loss was unlikely to be CHL. In fact, much poorer ABR morphology (i.e., flat responses) was noted for the left ear. Abnormal morphology of ABR waveforms is typically seen in patients with SNHL.[6] Recall that the ABR threshold was 75 dB nHL for the right ear and no response was observed at 100 dB nHL for the left ear. It is worth stating the ABR thresholds have been demonstrated to agree well with the behavioral thresholds (within 5–10 dB), particularly at high frequencies when stimulated by clicks stimuli.[6,15,16] Based on the overall results, the type of hearing was likely to be MHL for both ears. Herein, apart from the poor ABR morphology, CHL was not in favor because the hearing levels did exceed 60–70 dB. As reported elsewhere, the typical hearing levels for CHL rarely exceed 60–70 dB.[6] Meanwhile, SNHL was not the option as he had perforated TMs. Collectively, the patient was finally diagnosed with severe MHL in the right ear and profound MHL in the left ear.

In this report, the need of performing the simple APR test to diagnose hearing loss was particularly highlighted. As mentioned earlier, this test may not be used commonly nowadays (especially when dealing with adult patients) as more sophisticated hearing assessments are now available. Theoretically, by presenting high-level impulsive stimuli, a reflexive contraction of muscles around the eyes that produces a blink response should be observed.[17] That is, for those with normal-hearing or mild hearing loss, responses such as startle reflex and/or eye blinking are expected. As revealed,

the patient did not show any response at all when exposed to the loud /ba/ signal (105 dBA), and this observation suggests that the patient would have at least severe hearing loss for each ear. This impression was in fact consistent with the ABR results. Owing to this, in situations where the ABR test (or other objective hearing assessments) is not available, performing the simple APR test is clearly advantageous for estimating the hearing status, particularly among those with severe or profound hearing loss bilaterally. Furthermore, the use of /ba/ stimulus is also useful to estimate the hearing status at a low-frequency region. Nevertheless, the interpretation based on the APR result would become difficult if the patient does show the expected response as this is free-field testing (leading to several possibilities with regard to hearing diagnosis).

In terms of case management, his family members were counseled accordingly, and the use of hearing aids was recommended (in conjunction with regular ORL follow-ups). A hearing aid trial session was scheduled, and his progress will be monitored from time to time.

Clinical Significance

It is imperative for clinical professionals to be dynamic in planning and choosing the most appropriate tests to effectively diagnose the hearing status of their patients. Even though there are many sophisticated hearing tests available nowadays, the use of an old-fashioned hearing test is still necessary. In this report, the clinical usefulness of the APR test when testing a mentally challenged hearing-impaired adult is highlighted. To conclude, this test is simple to administer (without the need for additional equipment or special instructions) and able to estimate hearing levels in bilateral severe or profound hearing loss cases (particularly in situations where other audiological tests are not available or malfunctioning).

Orcid

Mohd Normani Zakaria https://orcid.org/0000-0002-3694-3460

References

1. Wan Mohamad WN, Romli M, Awang MA, et al. The presence of unusual bone conduction thresholds in pure tone audiometry. Indian J Otol 2020;26(1):54–57. DOI: 10.4103/indianjotol.INDIANJOTOL_99_19.
2. Zakaria MN. The effectiveness of sound therapy in treating patients with mild and severe tinnitus. Int J Disabil Hum Dev 2020;19(2): 215–219. PMID: 26541232.
3. Zakaria MN, Salim R, Tahir A, et al. The influences of age, gender and geometric pattern of visual image on the verticality perception: A subjective visual vertical (SVV) study among Malaysian adults. Clin Otolaryngol 2019;44(2):166–171. DOI: 10.1111/coa.13255.
4. Zuraida Z, Mohd Normani Z, Dinsuhaimi S, et al. Development of Malay version of vertigo symptom scale (MVVSS) for clinical use. Malaysia J Med Health Sci 2010;6(2):31–39. PMID: 23082446.
5. Zakaria MN, Aw CL, Zainun Z. Considerations when analyzing vestibular evoked myogenic potential (VEMP) outcomes elicited by chirp stimulus in healthy participants. J Int Adv Otol 2015;11(3): 271–272. DOI: 10.5152/iao.2015.1703.
6. Katz J, Chasin M, English K, et al. Handbook of Clinical Audiology. Philadelphia: Lippincott Williams & Wilkins; 2015.
7. Romli M, Wan Mohamad WN, Awang MA, et al. The clinical value of bilateral bone conduction testing in hearing diagnosis. Indian J Otol 2020;26(3):182–185. DOI: 10.4103/indianjotol.INDIANJOTOL_106_20.
8. Lih AC, Zakaria MN, Mohamad RA, et al. Effects of ethnicity and gender on the middle ear function in Asian adults. Indian J Otol 2017;23(2):94–97. DOI: 10.4103/indianjotol.INDIANJOTOL_27_17.
9. Zakaria MN, Jalaei B, Wahab NA. Gender and modulation frequency effects on auditory steady state response (ASSR) thresholds. Eur Arch Otorhinolaryngol 2016;273:349–354. PMID: 25682179.
10. Zakaria MN, Jalaei B, Aw CL, et al. Are speech-evoked auditory brainstem response (speech-ABR) outcomes influenced by ethnicity? Neurol Sci 2016;37(6):943–948. DOI: 10.1007/s10072-016-2522-0.
11. Jalaei B, Zakaria MN, Azmi MHM, et al. Gender disparities in speech-evoked auditory brainstem response in healthy adults. Ann Otol Rhinol Laryngol 2017;126(4):290–295. DOI: 10.1177/0003489417690169.
12. Wahab NAA, Wahab S, Rahman AHA, et al. The hyperactivity of efferent auditory system in patients with schizophrenia: A transient evoked otoacoustic emissions study. Psychiatry Investig 2016;13(1):82–88. DOI: 10.4306/pi.2016.13.1.82.
13. Awang MA, Zakaria MN. Acoustic reflex testing in clinical audiology: What is the next direction? Int J Disabil Hum Dev 2019;18(2):123–128.
14. Awang MA, Zamri NN, Romli M, et al. Acoustic reflex latency (ARL) assessment in Malaysian adults: The effects of age, gender and stimulus frequency. NeuroQuantology 2019;17(1):145–150. DOI: 10.14704/nq.2019.17.01.1925.
15. McCreery RW, Kaminski J, Beauchaine K, et al. The impact of degree of hearing loss on auditory brainstem response predictions of behavioral thresholds. Ear Hear 2015;36(3):309–319. DOI: 10.1097/AUD.0000000000000120.
16. Gorga MP, Beauchaine KA, Reiland JK, et al. The effects of stimulus duration on ABR and behavioral thresholds. J Acoust Soc Am 1984;76(2):616–619. DOI: 10.1121/1.391158.
17. Gelfand SA. Essentials of Audiology. New York: Thieme Medical Publishers; 2016.