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Hearing assesment of a malingering patient

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Abstract: The objective of this paper is to evaluate the various possibilities of assessing patients with alleged hearing impairment. The method used to elaborate this study is literature research and a clinical case presentation. The conclusion of the review is that although the assessment of the malingering patient is not a very frequent situation encountered in the day-to-day audiology practice, there are special tests that can be performed in order to detect the simulation. These tests are classified in conventional or subjective audiometric tests and objective tests. The objective tests that can be used are: impedancemetry with stapedian reflex testing, otoacustic emissions (OAE), and electrophysiological testing such as: brainstem evoked response audiometry (BERA), Auditory Steady State Response (ASSR), cortical evoked response audiometry (CERA). In the last period of time the conventional audiometry is seldom used, the objective electrophysiological testing being utilized with an increased frequency for detecting malingering.

Key Words: malingering patient, audiology, hearing loss, electrophysiological hearing tests.

Simulation is not a very frequent situation in audiology but it is one of the most challenging subjects for an audiologist. Some of the patients may have the interest of simulating a hearing deficit in order to shirk responsibility or receive financial compensation, medical or legal suit. The simulator may exaggerate a preexisting hypoacusis or might pretend to be deaf although he has a normal hearing. Apart from the financial gain that can be involved, some patients may have a psychological issue, (e.g. seeking for attention), or even a psychiatric problem. In the field of occupational medicine, the audiological diagnosis of a malingering patient might be useful in detecting persons that wish to hide a hypoacusis, aiming the acquirement of professional positions that contraindicate such a pathology.

There is also possible the situation in which the patient mimics a hearing impairment in order to avoid a certain job or in order to obtain financial compensations.

There are several questions. When should we suspect a simulation? How to detect a malingering patient? What are the best audiology tests capable of detecting a simulation?

The first issue an audiologist encounters is the problem of suspicioning malingering. What are the clues that can lead us to suspecting a simulator?

• Unlike in deaf persons the quality of voice is normal in malingerers.

• Cochleoauricular / pupillary / palpebral reflexes are normally present in these patients. These reflexes cause twitching of pinna / contraction of palpebral muscles on exposure to loud noise.

• Discordance between answers, atypical aspect of the graphic at the tonal audiogram, modifications of the threshold at different frequencies at repeated examinations.

• A patient with a bilateral profound hypoacusis which responds to questions asked with a low voice.

• An ancient bilateral cophosis with a minor

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impairment of the language.

• A unilateral hearing loss at a person which the mimic exaggerated efforts of understanding.

• The existence of discordance between different audiometric tests. One must suspect a simulation when the results at the vocal audiogram are above the tonal audiogram.

• A vocal audiogram in which the patient repeats only a part of the words presented. A real deaf will understand some words but in their integrality.

• Obvious interest for obtaining some sort of financial benefit.

Organic causes of hearing loss must always be excluded by thorough clinical examination and testing [1, 2].

There are several tests that can be used to detect simulants. The tests can be classified into objective audiometry tests and of subjective audiometry tests [3].

Pure-tone audiometry testing (see Figure 1).

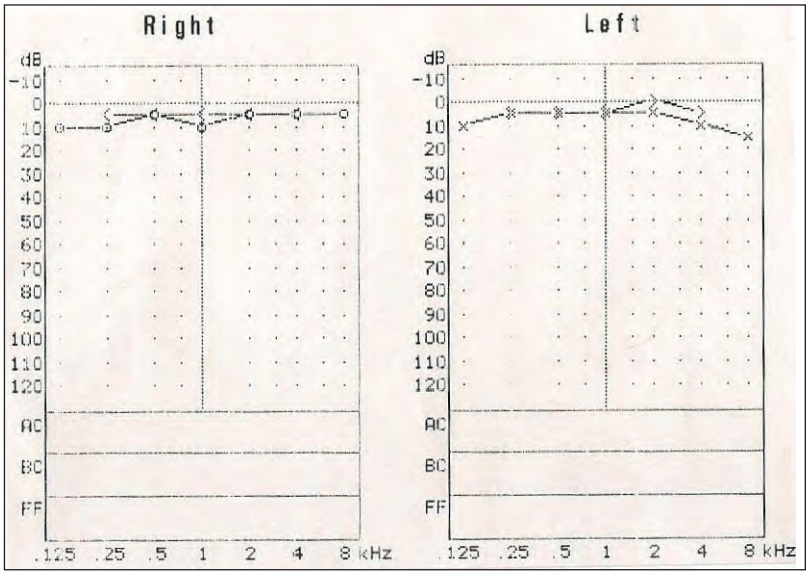

Figure 1. Pure tone - audiometry, normal hearing

When we suspect a simulator we can use sensibilization tests such as Stig Arlinger test or we can compare the thresholds in ascendant and descendent detection, lateralization test, or the Stenger test.

Stenger test

The Stenger test is a well kown test that permits to declare malingering but only in case of unilateral deafness or important assimetry. The principle on which this test is based was discovered by Stenger in the beginning of the nineteen century. He noticed the fact that if two sounds of the same frequency and slightly different intensity are received in the same time in both ears, the subject will believe he hears the tone only with the ear where the sound is louder. That is how we can explain the lateralisation at the Weber test in case of unilateral neurosensorial deafness.

How this test is performed? Usually we start by emitting a sound 10 dB over the threshold in the good ear and a sound 10 dB under the threshold in the suspected ear. There can be two situations:

- the hypoacusis is real and the patient hears only with the good ear

- the real threshold is better and the subject pretends he doesn't hear because he doesn't know that a sound is delivered in his good ear due to the fact that he is hearing only in the bad ear. And this is how simulation can be demonstrated [4, 5].

Stig Arlinger test

Stig Arlinger test is a test that consists in counting the impulses presented in order to detect the threshold. The test is initiated by presenting a tone above the recognized threshold and this tone is repeated randomly in a number between one and ten impulses. The patient is asked to count the impulses. If the patient hears the sounds, we will increase the intensity with 10 dB, if the patient doesn't hear we will lower the sound with 10 dB [6].

Comparing thresholds in ascendent and descendent testing

Comparing the thresholds in ascendent and descendent testing might be usefull considering the fact that normally there is a difference of maximum 5 dB between the two methods. The simulant is not capable of mantaining the same level of reference in connection with his real threshold. Alternating the searching method in destabilizing for him and we can find differences of 20dB or more [7-9].

Lateralisation test

It's a simple test for detecting a patient pretending of to have a unilateral cophosis or a profound unilateral hypoacusis. If we test a cophotic ear using a sound at 100 dB, normally, due to the lateralization phenomenon, the patient will hear at least 30 dB with the other ear, so a real deaf will signalize the fact that he hear something. The malingering patient will not recognize the fact that he has any acoustic sensation while testing the involved ear [10-12].

Vocal audiometry

Maintaining the intensity references is much more difficult to observe in vocal audiometry. Patients that repeat only part of the words and not the words in their integrality should be suspected. A real deaf will repeat a reduced number of entire words.

The Lombard test consists in asking the patient to read a text with the earphones on. During the lecture a sound will be emitted in the earphones. A real deaf person will not change the intensity of the voice during

the test. A malingerant will increase the voice intensity because of the cohleo-phonator reflex.

The Lee test consists in recording the voice of the patient while he is reading a text and playing it back to him with a little delay. A normal person is not capable of continuing the reading while a real deaf will continue.

The Carhart test

We can destabilise the simulator by alternating the word lists with various intensities, alternating high intensities and low intensities and modifying them progresivelly to a lower level. For example: 70dB/50 dB, and then 65dB/45dB, and then 60dB/40dB.

In such a manner that the simulator, believing that we are oscillating between the same two thresholds will answer recognizing all the words to the high intensity and will not recognize any word at the low intensity. We can find a situation in which the patient didn't understand any word at certain intensity and recognizes every word of the list few minutes later at the same intensity.

These tests we described above are seldom used in the last period taking into account the fact that now there are available objective audiometry tests that can detect the real threshold. In medical expertise these are the tests that are the ones required to establish the real threshold of a simulant [13].

Objective audiometry tests

The objective audiometry tests used to asses the malingering patient are impedacemetry and otoaccustic emissions (OAE), and also electrophysiological testing such as: brainstem evoked response audiometry (BERA), Auditory Steady State Response (ASSR), cortical evoked response audiometry (CERA).

Impedancemetry (see Figure 2a).

Impedancemetry can be used to detect malingering mainly by testing the stapedian reflex. An acoustic reflex threshold is a middle ear measurement of stapedius muscle response to higher intensity sounds. Consider the softest sound that elicits a reflex contraction of the stapedius muscle as the acoustic reflex threshold. The change in the middle ear immittance can be detected as a deflection in the recording (see Figure 2b).

It is well established the fact that the stapedian reflex is triggered by sounds with an intensity of 70-80 dB over the threshold. When a patient pretends he is cophotic and he exhibits a stapedian reflex at the same ear the malingerance is demonstrated.

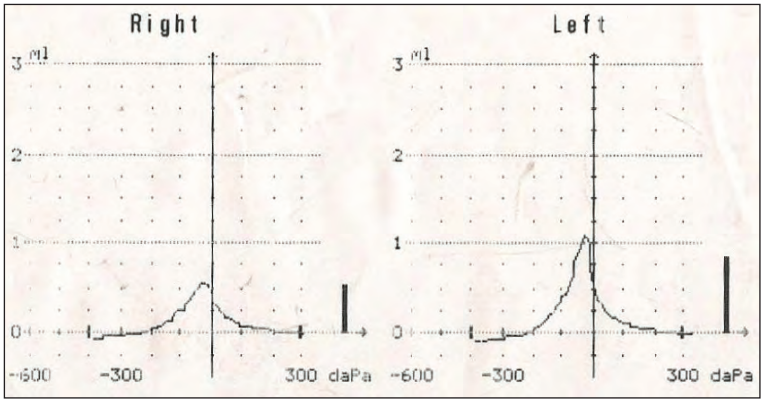

Figure 2A. Timpanometry, normal type A curves

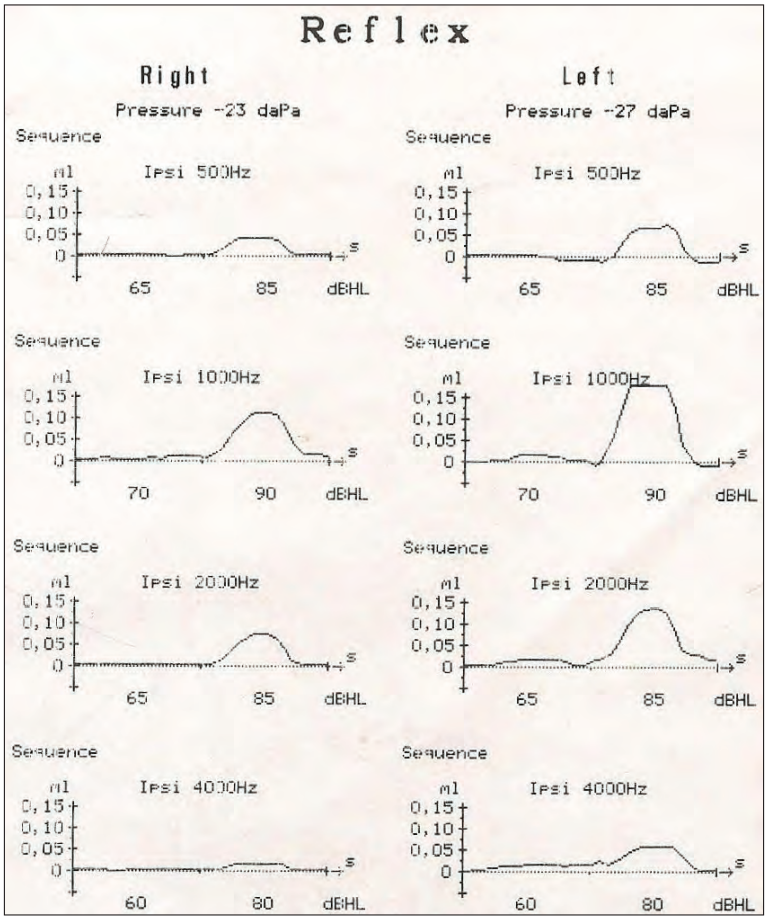

Figure 2B. Stapedian reflex

Otoaccustic emissions (OAE)

The principle of OEA is that the normal ear generates sounds that can be recorded. The presence of these sounds indicates the fact that the ear has a normal functionality. The rule of the thumb in OAE is the fact that they are present if the hearing in 30 dB or more. Therefore, the presence of OAE usually is considered a sign of cochlear health, but the absence of OAE is not necessarily a sign of abnormality. Otoaccustic emissions can be used to detect malingering, because the presence indicates a normal ear functionality [14-18].

Brainstem evoked response audiometry (BERA)

Brainstem evoked response audiometry (BERA) is based on the same principle as electroencephalography (EEG). The ear is stimulated with a sound (clicks or specific

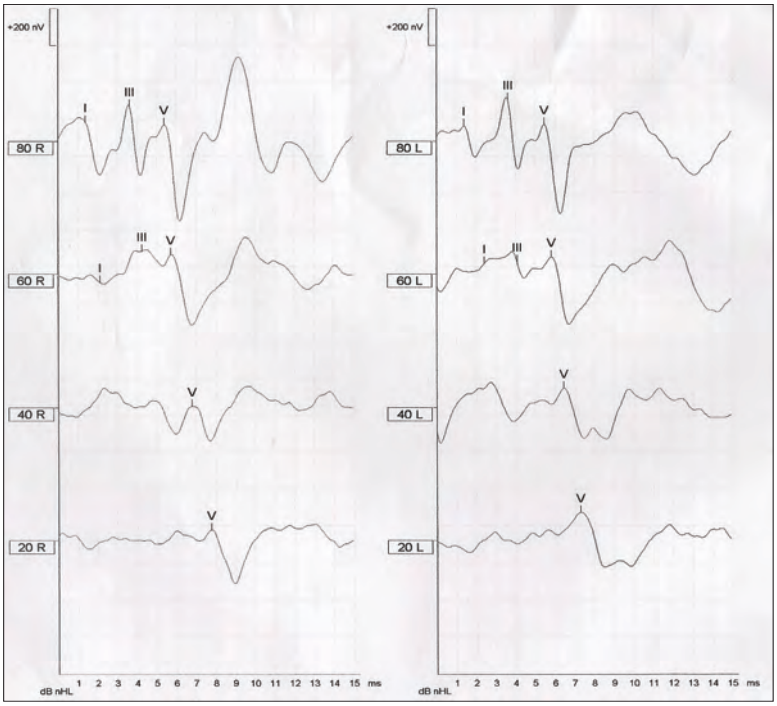

Figure 3. BERA, curves showing a normal hearing bilaterally

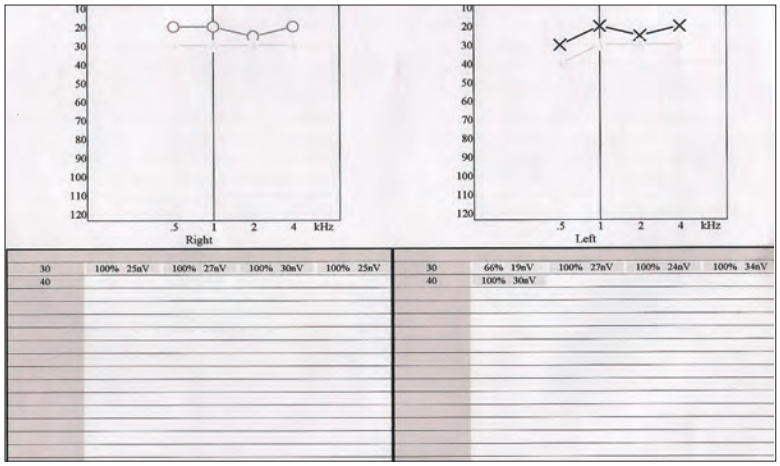

Figure 4. ASSR- estimated audiogram

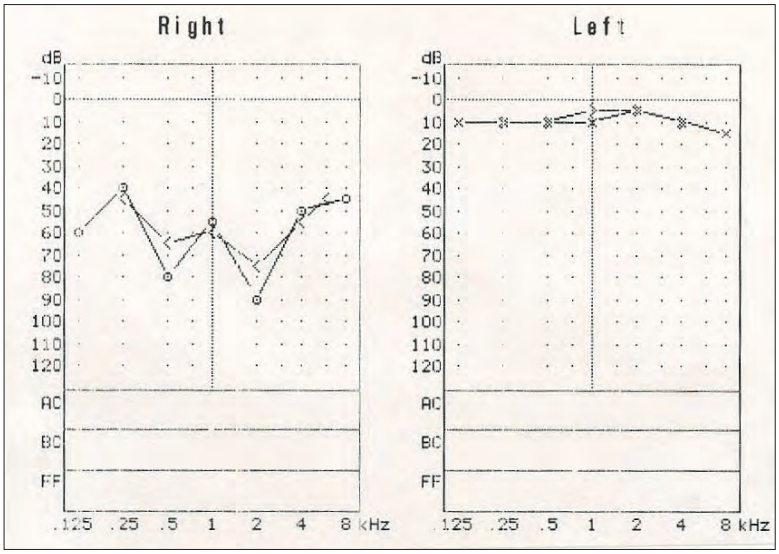

Figure 5. Pure-tone audiogram of the tested patient. Notice the unusual aspect of the graph for the right ear

frequencies) and the resulting electric activity is registered. This enables the examiner to follow the electric wave in it's way from the ear to the central nervous system [19-21].

The graphic representation of BERA is a succession of waves described by Jewett and named JI to JVII (see Figure 3).

The auditory structures that generate the auditory brainstem response are believed to be as follows:

Wave I – generated by the peripheral portion of cranial nerve VIII.

Wave II – generated by the central portion of cranial nerve VIII.

Wave III – generated by the cohlear nucleus.

Wave IV – generated by the superior olivary complex/lateral lemniscus.

Wave V – generated by the lateral lemniscus/inferior colliculus.

The most important wave is wave V. The intensity of the acccustic stimulus at which this wave appears is the considered to be the hearing threshold [22, 23].

ASSR Auditory Steady State Response

ASSR Auditory Steady State Response is also an auditory evoked potential, that can be used to asses the hearing sensitivity in individuals. ASSR yields a valid estimated audiogram (see Figure 4).

The ASSR uses statistical measures to determine if and when a threshold is present and is a "cross-check" for verification purposes in order to asses patients that are in the impossibility to participate at a clasic pure-tone audiometry or for malingering. The ASSR can estimate an audiogram used to describe the hearing performances of the simulant, requiring no cooperation from the tested patient [24-26].

Slow auditory evoked potentials

The application of slow vertex response audiometry (cortical evoked response audiometry), mainly in the diagnosis of pseudohypoacusis, is reported. Slow evoked auditory potentials or cortical evoked potentials use the waves elicited by different stimuli and detected by electrodes placed on the scalp. Slow auditory evoked potentials include the waves originated in the auditory cortex. This procedure is of interest in detecting non-organic hearing loss [27-30].

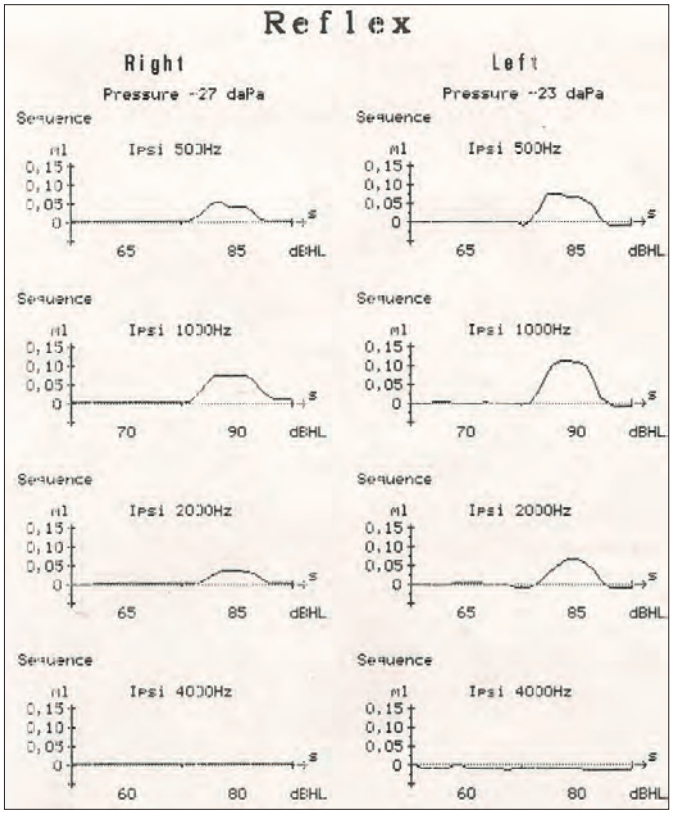

Figure 6. Stapedian reflex testing. Notice the presence of the stapedian reflex bilaterally at 85-90 dB HL

CASE REPORT

Furthermore we present the case of a 27 years female physician who wanted to change the profile of the residency programme she was attending. She pretended to have a right ear unilateral hypoacusis that impaired her capability of using the stethoscope; therefore she solicited the exchanging of a medical specialty with a surgical specialty.

The first audiogram we performed showed a graph with an odd shape that made us enquire about the accuracy of our exam (see Figure 5). For this first test we used the Hughson-Westlake technique to find the thresholds.

Because of the fact that the responses we received were doubtful we proceeded by using both the descending and the ascending method to establish the thresholds. We found differences bigger then 20 dB between the two testing methods. The aspect of the graph was unusual and in consecutive test-retest assessments we found different values.

It would have been appropriate to perform a Stenger test but we couldn't because of the fact that we needed an audiometer with two channels.

In the next step, in order to certify the fact that the hypoacusis wasn't real we performed a impedancemetry that established the fact that the patient had a type A tympanogramme with the presence of a stapedian reflex bilaterally elicited at intensities of the sounds of 85-90 dBHL (see Figure 6).

At this point the malingering was demonstrated but we proposed to the patient an electrophysiological examination in order to establish the real threshold for the two ears. The estimated audiogram at the ASSR testing is represented in Figure 7. Notice the fact that the hearing acuity is normal bilaterally with estimated thresholds at 20 and 25 dBHL. The BERA examination yielded the result showed in Figure 8.

We could remark the presence of the wave V from the intensity of 20 dB HL, bilaterally as a demonstration of the fact that the person in investigation had a normal level of acoustic acuity.

DISCUSSIONS - CONCLUSIONS

Although malingering in audiology is not a very frequent situation, the non-organic hypoacusis is a possibility that might occur during the dayly practice. This might happen to a normal patient seeking for some sort of material benefit, or to a patient with psychological or psychiatrical disorder.

There are some indicators that should to be kept in mind in order to suspicionate a malingering patient. The most important indicators are: the quality of voice (unlike in deaf persons the quality of voice is normal in malingerers); the existence of a discordance between different audiometric tests (one must suspect a simulation when the results at the vocal audiometry are above the tonal audiometry); cochleoauricular / pupillary / palpebral reflexes that are normally present in simulants; any cause of suspecting a financial benefit.

There are special audiometric tests that can be used for the detection of the simulating patient. These tests are classified in conventional audiometry tests and objective tests.

The conventional audiometry tests that can be performed are: the

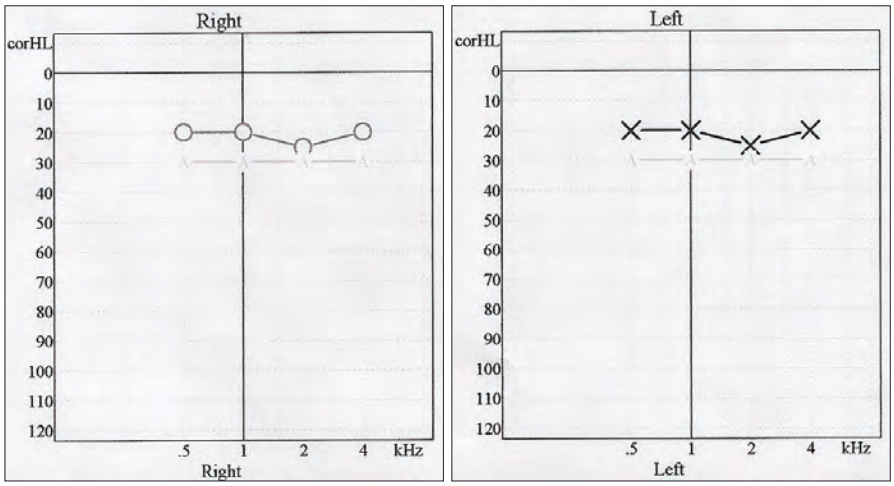

Figure 7. Estimated audiograme. ASSR testing. Thresholds at 20 dB HL at 500, 1000, 4000 Hz; and thresholds at 25dB HL at 2000 Hz showing a normal hearing acuity

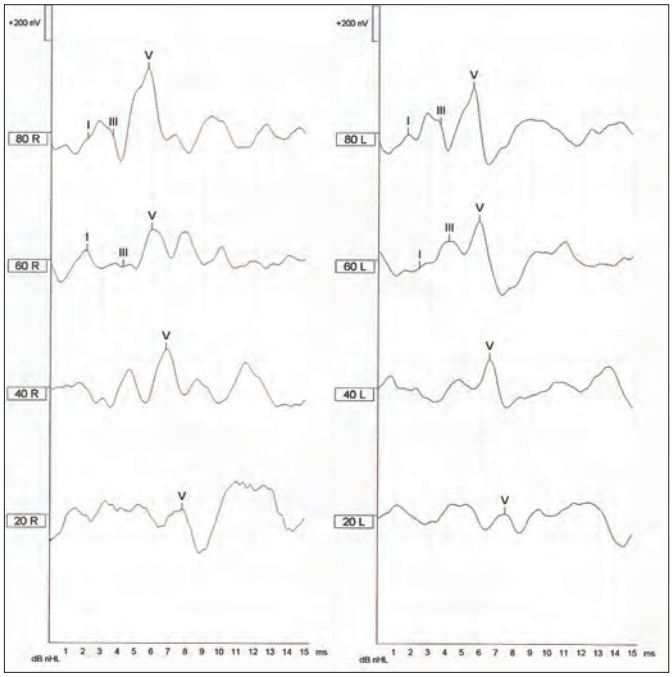

Figure 8. BERA of the tested patient. Notice the presence of wave V at 20 dBHL.

Stig Arlinger test, comparing the thresholds in ascendant and descendent detection, lateralisation test, or the Stenger test.

The vocal audiometry tests used to asses the malingering are: the Lombard test, the Lee test, the Carhardt test.

The objective audiometry testing of the malingering patient is based on a battery of tests that do not require the cooperation of the patient. The objective audiometry tests used to asses the malingering patient are impedacemetry and otoaccustic emissions (OAE), and also electrophysiological testing such as: brainstem evoked response audiometry (BERA), Auditory Steady State Response (ASSR), cortical evoked response audiometry (CERA).

In the last years there is a tendency of decreament in the use of clasic audiometry tests in the assesment of the malingering patient. The objective electrophysiological testing is used increasingly in spite of the costs involved. One of the most important things to remember is the fact that, prior to suspicioning a malingering, we must exclude organic causes of hearing loss by thorough clinical examination. In case of doubt, for selected patients specific diagnostic methods can be used: CT scan, MRI, angiography.

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