SCREENING TESTS FOR NONORGANIC HEARING LOSS

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Introduction

Non-Organic Hearing Loss (NOHL) is a fairly common presentation in service patients who feign hearing loss to avoid service obligations and for personal and economic gains. The aim of this article is to stress the importance of having a high index of suspicion to weed out such cases and to highlight the utility of simple unaided hearing tests, which have been lost in the ocean of technological advancement in detecting NOHL. These tests have been retrieved from literature and have been described in detail as they are simple enough to be adopted even by general practitioners.

Case Report

A 35-year-old male patient in Cat CEE (permanent) for CSOM (L) effects of, reported to the ENT OPD for recategorisation. The onset of his disease was in 1995 when he developed otalgia in left ear followed by blood stained otorrhoea which subsided after treatment. Thereafter he complained of persistent hearing loss and tinnitus in left ear. There was no vertigo or headache and no nasal or throat complaints. There was no h/o noise exposure, intake of ototoxic drugs, trauma or any systemic disease. Examination of the ears revealed intact and mobile tympanic membranes without scarring or signs of any healed perforation. Tuning fork tests were inconsistent. Neurological examination was normal. Nose and throat revealed no abnormality. An unconvincing history, normal appearance of tympanic membrane and variable tuning fork tests aroused suspicion regarding possibility of non organic hearing loss. He was then subjected to a battery of simple audiological tests since no sophisticated tests were available. Erhards tests and Lombards tests indicated non organic loss, Chimani Moos and Stenger tests lent more credence to our suspicion. Audiometry showed inconsistent responses. The behaviour of the patient in the ward was also observed. As the diagnosis of NOHL was confirmed the patient was directly confronted and he confessed to having no disability and accepted he was a malingerer.

Discussion

Non-organic hearing loss (NOHL) may be either psychogenic, feigned or artefactual when there is either inattention or misunderstanding of the audiometric task [1]. A large number of tests have been described to detect NOHL. These tests vary from

simple speech and audiometric tests to the sophisticated electrophysiological tests.

Evaluation of a patient with suspected NOHL proceeds in a systematic manner and starts on first contact with the patient.

A) Observation

Observation of the general behaviour of the patient provides vital clues regarding the nature of hearing loss. The general attitude of those with feigned deafness is one of very obvious exaggerated hearing loss and there is no change in their voice which remains at normal intensity. There is lack of eye contact and discrepancies in observing lip movements. Observing the patients at informal times and checking the volume of the hearing aid if they are using one at these times is helpful.

B) Voice Tests

Many simple tests have been described to detect non-organic hearing loss.

1) *Erhards Test:* This test is suitable for detecting total unilateral hearing loss. It depends on the fact that occlusion of the meatus of normal ear attenuates speech by 30dB or less and does not eliminate speech altogether. The suspected malingerer is asked to close his eyes and repeat words heard. He is told that the normal meatus is being occluded and the examiner closes it by pressing the tragus. Words are then spoken in the suspected ear, failure to repeat indicates malin-gering since even with head shadow effect the other ear should be able to hear.

2) *Lombards Test:* This test is based on the principle that an individual raises his voice when speaking in a noisy surrounding. The patient is asked to read a prose. Noise is then applied to the good ear. If there is organic loss in the suspected ear then the voice level is raised, if feigned then normal monitoring is unimpaired and there is no change in speech.

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3) *Hummel Double Conversation Test*: This test depends on confusing effect of different voices giving different messages to the two ears. If one ear is deaf then the patient hears only one speaker. Test is performed with two speakers each using separate speaking tube to each ear. Each speaker asks different questions and tries to confuse the patient [2].

4) *Teuber Two Tube Test*: This test is similar to the Hummel test. Two tubes are coupled one to each ear. Examiner stands behind speaking into either tube and asking the patient to repeat. Alternate compression of tubes is done to confuse the patient.

5) *Coggins Stethoscope Test*: This test is similar to Teuber test, a stethoscope is used instead of two tubes.

6) *Callhans Voice Test* The examiner stands behind the subject. His voice is delivered to the subjects ears via two separate different lengths of rubber tubing. In normally hearing subject the examiners voice appears to come from the ear coupled to the shorter tube. If the (R) tube were shorter it would be from the (R) ear however if a subject was feigning deafness (R) side he would deny hearing anything [3].

7) *Swinging story Test*: In unilateral hearing loss a story is presented to both ears or either ear in parts and patient is asked to repeat. A subject feigning deafness would be able to repeat the complete story without gaps [4].

8) *Speech Delayed Auditory Feedback*: Speech is recorded and then fed at a delay of 0.2 secs into the suspected ear. A normal person starts stuttering or may not be able to speak.

9) *Doefler Stewart Test*: This test is performed to confuse the patient by presenting noise in his ears so that he loses his yardstick if his intention is to consistently respond to words above threshold as though they were at speech reception threshold.

C) *Tuning Fork Tests*:

Chimani, Moos, Stengers and Teals test are very useful in detecting non-organic hearing loss. Teals test is used in patients who claim to hear only by bone conduction. Tuning fork is first placed on the mastoid process and the person hears, then non vibratory fork is placed on the mastoid and vibratory fork in front of the ear to confuse the patient about the source of the sound.

D) *Pure Tone Audiometry (PTA)*

1) *Variability of response*: Most patients give fairly repeatable responses. However patients may show differences of 10dB or more between ascending and de-

scending approaches to threshold, anticipating stimuli in descending intensity mode they fail to respond to ascending mode until well above threshold.

2) *Nature of response* : In NOHL the general demeanour is indicative and delayed response is noticed.

3) There is variation between clinically observed hearing disability and audiometric thresholds.

4) *Air conduction shadow tests*: Maximum interaural attenuation at any frequency has been found to be 85dB, [5] and average attenuation across all frequencies has been reported at 63dB. Thus an apparent unmasked difference between two ears exceeding 83dB at any individual frequency or 70 dB averaged over a range of frequencies is unlikely to be organic in nature.

5) *Bone conduction shadow test*: The maximum averaged bone conduction transcranial loss has been found to be less than 15dB, [6]. Thus difference of unmasked bone conduction thresholds between ears exceeding 15dB are likely to be nonorganic.

6) *Stenger Test*: This test is based on Tarchanow Phenomenon which states that when pure tones of equal intensity are presented bilaterally they are fused into a single sound in the median plane. This test is very reliable in detecting unilateral NOHL of more than 10dB. However the test may fail due to diplacusis binauralis or vibrotactile sensation [7].

7) *Speech Audiometry*: Variability of response at different times and comparison with PTA can help in detecting NOHL.

E) *Objective Tests*

A large number of objective tests have been in use. Some of them like EEG audiometry which recorded change in EEG from sleep pattern to awake pattern on application of sensory auditory stimuli and Electrodermal and Psychogalvanic audiometry which measured changes in skin resistance on introduction of pure tones have now become obsolete and have been replaced by more reliable and objective tests like acoustic reflex threshold and brain stem evoked response audiometry which are currently the best tests available to detect NOHL. Two tests currently in the realm of development and research may be the best modalities available in future to detect nonorganic hearing loss.

There is a relationship between flow of electrical currents in nerves and the magnetic field associated with this flow. Thus exploration of this magnetic analogue of auditory evoked potential though yet not of proven clinical utility may prove to be useful after intensive research [8].

Otoacoustic emissions generated by the cochlea and recorded in the external auditory meatus of normal hearing person have the potential to provide insight into the type of hearing loss [9].

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