

AUROPALPEBRAL-REFLEX AUDIOMETRY

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Indications:

Hearing should be examined as soon as possible in cases of suspected pre- or postnatal hearing impairment as well as in those who fail to develop normal speech during the 1st- 2nd year of life. The method used for audiometric examination of children requires a certain amount of cooperation on the part of the patient. More or less exact results may be obtained with children 2—3 years old, but not younger.

In younger children and in sucklings evaluation of hearing acuity could only be based on the relation to acoustic stimuli or on objective hearing tests. The methods of choice are the psycho-galvanic skin-reflex audiometry as well as other acoustically conditioned reflexes, such as pupillary-, stapedius- and auro-palpebral reflexes. The last method may be executed easily, quickly and securely.

Physiology of the auro-palpebral-reflex.

Here, one is dealing with a defense-reflex. The complete reflex-arch is not well known. It is assumed that afferent stimuli travel along the cochlear nerve. The reflex-route passes over the reticular substance. The efferent stimuli are transmitted by the facial nerve to the end-organ, i.e. the eyelids. The long latency period of 0,1—0,5 sec. and the constantly bilateral reflex-response speak against a direct conduction from the cochlear nerve into the facial nucleus. The fact that the reflex vanishes during anesthesia, makes it improbable that the reflex-arch passes through the cortical hearing center.

Equipment and technique.

Sound is obtained from a pure-tone audiometer with a maximal loudspeaker output amplified to produce tones of 115—130 db. The usual apparatus with a smaller output fails to yield definitive results in cases of advanced hearing impairment. The examination is done for the frequency range 125 and 4000 cps with a 30 cm standard distance between the loudspeaker and the patient's ear. It is preferable to use alternately two hidden loudspeakers placed on both sides of the patient. The necessary surprise-effect is missing when headphones are used. Children dislike headphones, and false measurements are possible through tactile impulses. One may evoke a short, i.e. a short lasting, tone-impulse of an intensity up to 130 db with the help of a push-button-transmitter, without letting the child notice it. The refractory period of the reflex is 0,3—0,5 sec. according to ZWAARDEMAKER and LANS, and

0,15 sec. according to DODGE. A time interval of 1—2 sec. should be used during the test.

Method of measurement.

The acoustic stimulus should be applied while normal lidclosure is being observed (2—40 beats per minute). In this way overlapping of the normal and the reflex-lid closure can be avoided. Facial musculature should be relaxed; crying children cannot be tested. In a monaural test the better hearing ear should be examined first. In children who presumably hear well the first tone stimulus to be used should be one of 1000 cps at 100 db. Negative results will be obtained in most normally hearing persons, if a tone intensity of less than 90 db is used. If lid-closure appears, then one may proceed to test the remaining, increasing frequencies with the same intensity. If the result is negative, then the intensity should be increased step-wise by 10 db, until a reflex is elicited. The reflex will be judged positive, if it appears with two different frequencies. Occasionally one may observe in inner ear lesions with a hearing loss in the high frequency range a missing reflex at high tones and a positive reflex at the lower frequency range. The tone stimulus should always be very short (0,3 sec.) in order to avoid damaging the ear. With

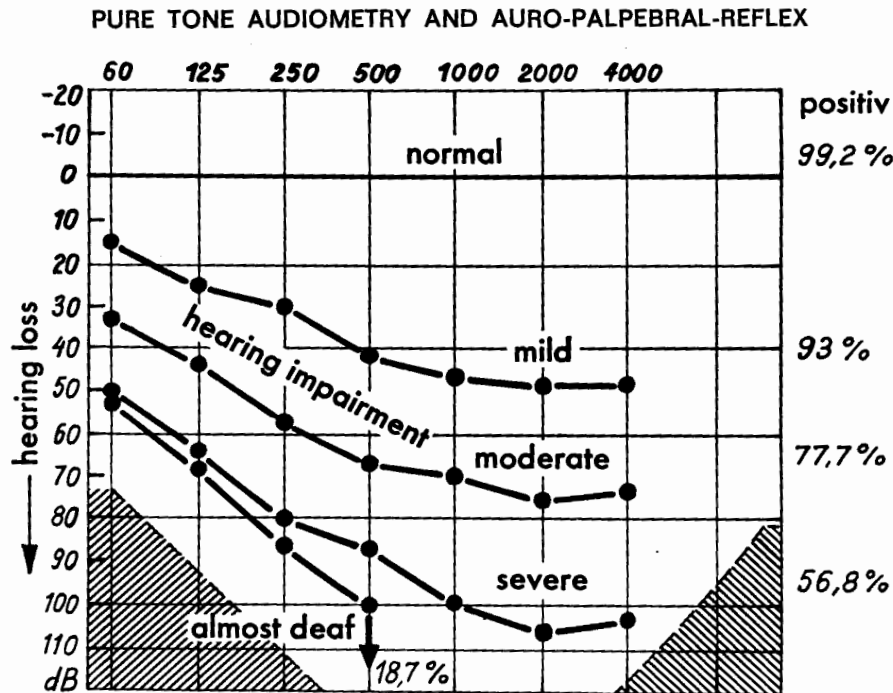


Fig. 1. Comparison between the results of the pure tone and reflex-audiometry. A positive reflex indicates a more or less good hearing acuity, while a negative reflex may mean either deafness or severe hearing impairment.

repeated stimuli of the same frequency fatigue or habitude can set in, it is important to try to complete the test with only few tone stimuli. The whole test takes no longer than 5 minutes, but should be repeated in uncertain cases.

Evaluation of the reaction.

The test is described as positive, if a reaction is observed ranging from a fine tremor of the upper and lower lid to a forceful lid-closure. Except in facial palsy, one will not observe differences between the two sides. Rarely, the reflex reaction may extend also into the contralateral side of the face, f.i. the corner of the mouth or the cheeks. Sucklings and nervous children often react also with a generalized fright reaction or a muscular reflex, and an alteration of the respiratory rate may be seen. Sick children show a weakened reaction-activity, and those results are, therefore, less reliable. If the auropalpebral-reflex is negative, but the child turns aside in the direction of the source of the sound, then the result should be evaluated as positive.

Evaluation of the results.

225 children aged 4—17 years were examined with the usual threshold-audiometry as well with the reflex-audiometry (HAHLBROCK: Arch. Ohr- usw. Hk., **174** (1953) 139). With practically all (99,2%) normally hearing children a positive reflex was observed. With an increased degree of hearing impairment the percentage of a positive reflex is dropping, as shown in the following table.

There is a marked individual difference in the reaction. In many normally hearing children a positive reaction may be elicited only with high sound intensities of 120 db. On the other hand, hard of hearing children may occasionally show a positive reaction already with 90—100 db. No interrelation could be observed between the type of hearing impairment (conductive or perceptive) as well as the degree of hearing loss (mild or advanced) and the incidence of a positive reflex. However, one may say that a positive reflex indicates, with a high degree of probability, a more or less good hearing acuity, while a negative reflex may mean either deafness or a more or less advanced hearing impairment.

AUDIOMETRIE PAR REFLEXE COCHLEO-PALPEBRAL

Au lieu d'utiliser l'audiométrie tonale et vocale qui ne peuvent être effectuées avec succès qu'au delà de l'âge de 2 à ans, on peut obtenir des résultats assez précis par l'audiométrie par réflexe cochléo-palpébral chez des nourrissons et des débiles. Avec un audiomètre tonal muni d'un amplificateur supplémentaire, qui augmente l'intensité maximale de 115 à 130 db, on peut faire entendre un son momentané au sujet examiné, en appuyant sur un bouton de déclenchement. La distance entre le haut-parleur et le sujet est fixée à 0,3 m. Chez une personne à audition normale on remarque presque constamment un tremblement faible des paupières et quelquefois même un clignement, ce qu'on considère comme résultat positif. Chez des sourds ce phénomène est enregistré autant moins fréquemment, que le malade est sourd, c'est-à-dire

il est analogue au degré de la surdité. Chez des sourds complets on n'obtient pas de réaction. Des sources d'erreur possibles sont:

- des sensations tactiles (provenant donc de l'écouteur);
- non-observation du clignement normale et
- contraction de la musculature faciale (p.e. pleurer).

Seul un réflexe positif permet d'affirmer que le son a bien été enregistré par l'appareil cochléaire. Si le réflexe est négatif, il peut s'agir, soit d'une surdité partielle, soit d'une surdité complète, et il faudra pratiquer des examens de contrôle dans un âge plus avancé jusqu'à ce que les méthodes standardes d'audiométrie donneront des résultats valables.

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