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The Value of Behavioral Methods of Hearing Examinations in Comparison with ABR

Wartość behawioralnych metod badań słuchu w odniesieniu do ABR

INTRODUCTION

Efficient hearing turns out essential in children as it conditions proper voice and speech development and influences their mental development. If the treatment and rehabilitation of hearing, voice and speech are to be conducted during the period of physiological development of speech, the hearing loss should be diagnosed before a child attains the age of one. In the early developmental period we can conduct non-objective hearing examination and brain stem evoked potentials. The analysis aimed at the evaluation of efficiency of non-objective hearing examination as compared with audiometry of evoked potentials.

MATERIAL AND METHODS

The analysis concerned 58 children (19 girls and 39 boys), the youngest being 6 months old and the oldest — 7 years old. All the children underwent non-objective hearing examination. The examination was conducted with the help of environmental sounds (such as whisper) and complex sounds produced by musical instruments (drums, clappers, dulcimers, fifes) graduated by sonometer. The children were exposed to different sounds of 0.5, 1, 2, 4 kHz frequency tones produced by a pediatric audiometer (PA-2 made by "Interacoustic").

The examination result was the mean of a few measurements taken for each instrument. In the case of children aged 3 visual audiometry was applied (Vera 103 made by "Madsen"). The results obtained by means of behavioral tests were compared with the mean calculated in ABR examinations. (It was the mean calculated on the basis of examination of both ears as well as of all basic frequencies).

RESULTS

The analysis of our material proves that children with hearing loss underwent their first hearing tests either before they attained the age of 1 or at the age of 2—3. Data concerning the children are presented in Figure 1.

In the group of children subjected to our examinations and analyses hearing loss frequently resulted from factors connected with delivery, infections, pregnancy and ototoxic drugs (Fig. 2).

In some cases a few factors potentially resulting in hearing loss were found (Fig. 3).

The analysis of ABR and non-objective hearing examination results indicated that the difference between results reached 10—20 dB (in 23 cases non-objective hearing examination results were higher than ABR, in 26 — they were lower, in 7 cases — identical and in 2 cases the difference reached 30 and 40 dB).

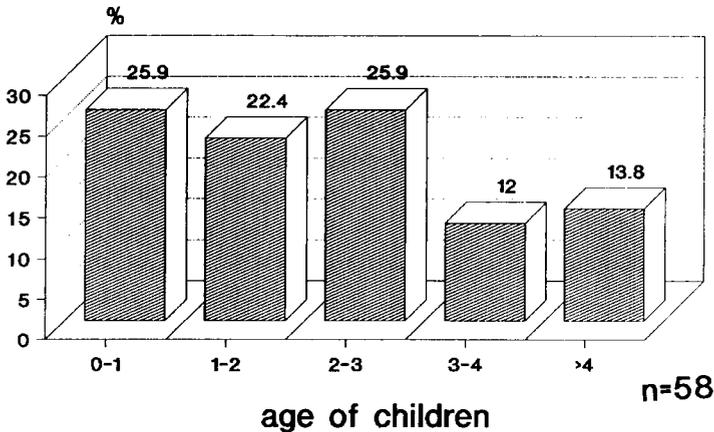


Fig. 1. The age of children at which they underwent the hearing examination for the first time

DISCUSSION

Kochanek and Zaleski (3, 4) reached similar results in objective audiometry with non-objective test. They emphasize the value of non-objective methods of hearing examinations employed in case of children.

Gravel and Traquina (1) admit the possibility of employing VRA as a method of hearing examinations, especially if patients are 6 to 24 months old.

A contrary opinion is held by Widen (6) who claims that non-objective hearing tests should be substituted by ABR.

According to Kaga (2) brain stem evoked potential, if employed within the first months of child's life, is more sensitive than behavioral methods. When

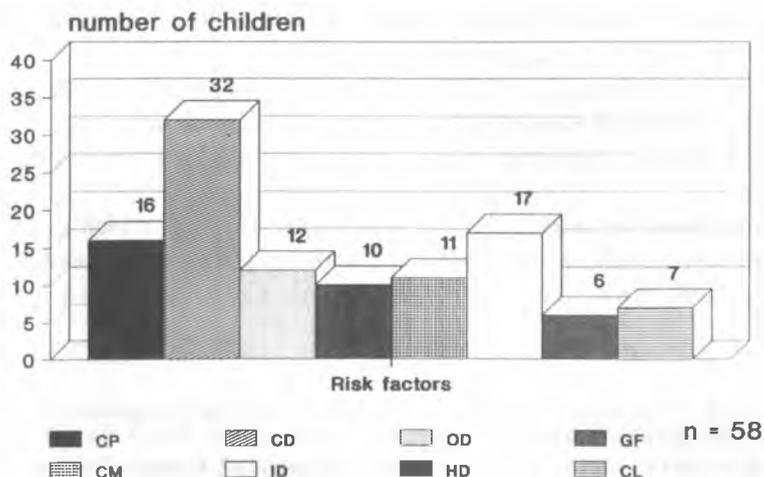


Fig. 2. Hearing loss risk factors; CP — connected with pregnancy, CD — connected with delivery, OD — ototoxic drugs, GF — genetic factors, CM — congenital malformations, ID — infections diseases, HD — head trauma, CL — consciousness loss

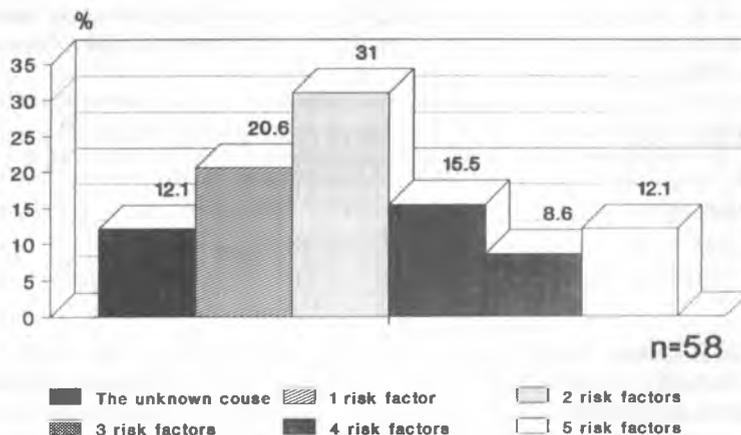


Fig. 3. The amount of risk factors resulting in hearing loss

a child attains the age of one the difference in results obtained by means of these two methods decreases to 10 dB. Around the age of 2—3 the difference disappears and therefore from that moment on the greater usefulness of non-objective methods can be observed. The above conclusion is also proved by our results. Non-objective hearing examinations are highly valued by Perier and De Temmerman (5).

Conclusions

1. In the case of children behavioral hearing examinations are still an essential method of screening tests.

2. In order to obtain reliable results non-objective examinations should be conducted by qualified audiometrists.

3. Non-objective tests as the first stage of selection in case of hearing loss should be popularised in out-patient medical service centres.

4. Each case of hearing loss should be subjected to brain stem evoked potentials.

5. Non-objective hearing examination, especially that which makes use of low frequency stimuli, is supplementary with regard to ABR examination.

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STRESZCZENIE

Wiadomo, że wczesne wykrycie niedosłuchu u dzieci i związana z tym następową rehabilitacją powoduje rozwinięcie prawidłowej mowy u dziecka. Istnieje możliwość wykonania badań metodami nieobiektywnymi (audiometria zabawowa, dźwięki z otoczenia), a także badań słuchowych odpowiedzi z pnia mózgu. Wykazano dużą zgodność badań obiektywnych z subiektywnymi, które mogą być stosowane jako badanie przesiewowe (wstępne badanie) u małych dzieci.