DIAGNOSIS AND SPEECH THERAPY OF TWO CHILDREN WITH A COCHLEAR IMPLANT SYSTEM

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Abstract

Background: Language communication is necessary for social and emotional development of each person. This applies particularly to deaf children. In the case of profound hearing loss it is very important to early apply a cochlear implant system, increasing the range of information reaching the child in the auditory way. This has a huge effect on speech understanding and evolution of mental processes. It allows the child, with an additional and regular rehabilitation, to achieve a much higher level of language development and acquisition of knowledge about the world than children without this appliance. The sooner a child has the opportunity of hearing and rehabilitation, the easier it will adopt in the environment of the hearing.

Aim: The object of the study was the diagnosis and therapy of two children with a cochlear implant system at preschool age. The aim was to show the overall functioning at different levels: cognitive, motor, emotional and, above all, the communication level of deaf children with cochlear implant.

Method: The research method used was the individual case method, aiming at the reliable diagnosis as well as the preparation and conducting of appropriate speech therapy. Direct observation of the tested children helped to evaluate their development in various spheres of life. The tested children had a very different family situation.

Results: The boy was neglected by his parents, however the girl owed the good functioning in language communication to intensive rehabilitation and systematic stimulation of auditory and linguistic skills in the family environment. Consequently, the children's communication difficulties varied. At the age of 5, the boy spoke just a few words heard from the environment but the girl reached the level of development of a 6-year old child.

Conclusions: The results showed that difficulties in the use of speech occur in the absence of rehabilitation and systematic help in the family environment in which the child with an implant develops. Diagnosis and speech therapy should take into account the level of language development and learning opportunities of the children with implants. Close cooperation with the family is crucial. Especially children with difficult family situations should be provided with psychological, educational, and speech therapies to compensate for or reduce the disparities of deaf children with their peers.

Key words: cochlear implant system • diagnosis • speech therapy

Background

Communication between people is an important psychological need in the life of every human being. It is important in any child's development. In a special way, it affects the knowledge about the surrounding world, as well as about himself/herself. A hearing-impaired child has limited opportunities to use the language of sounds, which in turn disrupts the social and emotional development. This has a huge impact on the development of the child's personality, mental processes and also on his speech development.

In the case of profound hearing loss, it is very important to apply an early implantation of a cochlear implant system, increasing the range of information reaching the child in an auditory way. This has a great effect on speech understanding and allows the child to reach, with an additional and systematic rehabilitation, a much higher level of language development, which in turn results in a better acquisition of knowledge about the world, compared with the children without the implant. The sooner the child will have the opportunity to hear and to be rehabilitated the easier he/she will adapt in the environment of hearing people.

Material

The subject of this study was the diagnosis and treatment of two young (kindergarten) children with a cochlear implant system. The aim of the study was to show the functioning of profoundly deaf children with cochlear implants on various levels: the cognitive, physical, emotional, and, above all, communication one.

The girl was provided with a hearing aid at two months of age and implanted at the age of two and a half years. The child had benefited from the apparatus, but when she entered the peer group it did not wholly meet her needs and the decision was made to implant a cochlear implant system. The girl has an implant in her right ear and a hearing aid in the left one. Rehabilitation after providing with the hearing aid and then after implantation has proceeded correctly and systematically. The social, emotional and

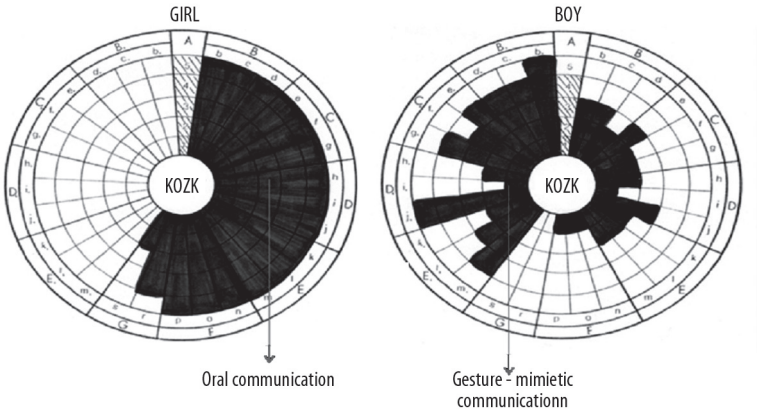

Figure 1. Charts from the Assessment Sheet of Communicative Behavior of a Child with Hearing Impairments [5].

communicative development ran almost as well as in the case of a hearing child.

The boy at 1.5 years was provided with hearing aids and at 5 years he underwent a cochlear implant surgery for the right ear. The child has had a very complicated family situation. His rehabilitation has not been systematic, with the consequence today of large dysfunctions in the overall functioning of the boy. The child is primarily under the care of his father, who irregularly brings the boy to the kindergarten, which deprives him of an opportunity of auditory and, above all, linguistic stimulation. His speech development is delayed, which has a huge impact on the functioning of the boy among peers and other people around him in various situations of everyday life. He mostly relies on the repetition of words or short phrases. The studied children differ primarily in their family situation. The boy is neglected in the field of parental help for a deaf child, while the girl owes her good language skills to intensive rehabilitation with systematic language-auditory stimulation from her closest environment.

Method

In the study the method of individual case was used, which was intended to place a reliable diagnosis and select an appropriate therapeutic program. Also, an analysis was carried out of the records from medical clinic, psychological and educational advisor and kindergarten. It provided basic information on the surveyed children. Using direct observation, their development was shown in the various spheres of life. Speech therapy research and therapy of two children at 5 years of age with cochlear implant system were conducted during individual meetings in kindergarten and at home. They took place twice a week for 2 years. It was mainly occupational therapy in the form of fun activities during which a direct observation of the children's behavior was conducted. The logopedic diagnosis was based on the following research techniques:

- Questionnaire prepared by the authors: interview and observation sheet.
- Assessment Sheet of Communicative Behavior of a Child with Hearing Impairments [5].
- *Home Rehabilitation Clinic*: Child Eloquence Score No. 6, Evaluation of Speech Perception in Children with Hearing Impairments No. 7 [2].

Results

The graphs presented below, constructed on the basis of the *Assessment Sheet of Communicative Behavior of a Child with Hearing Impairments* [5] show differences in the communication of the examined children (Figure 1).

The girl speaks in words very well. The boy, however, in his communication with the environment relies on gestures, facial expressions, speech reading of the mouth and uses a few words heard from the environment. The boy is about 3 months older than the girl and is at the stage of expression. The girl, in turn, at 5 years of age presents the speech level of a six-year-old child.

Another research tool was the *Home Rehabilitation Clinic*, in particular: *Child Eloquence Score No. 6* and *Evaluation of Speech Perception in Children with Hearing Impairments No. 7* [1,2].

Results of the screening test *Child Eloquence Score No. 6* showed that the boy had an abnormal articulation, knew few words, had great difficulty with the formulation of sentences, whereas the girl presented correct pronunciation, which was confirmed by the above-mentioned results (Figure 1) as well as by her direct observation.

The results of the rating scale *Evaluation of Speech Perception* suggested speech perception difficulties of the boy in the understanding of commands and recognizing them for correctness. The girl, however, very well understood the words addressed to her in each of the sets and recognized them correctly. Table 1 shows the survey results of perception assessment.

The results of this study suggest that difficulties in the use of speech occur in the case of the investigated boy. Lack of language stimulation, rehabilitation and parental assistance has affected the functioning of the child with cochlear implant.

Discussion

Systematic rehabilitation to a great extent gives deaf children the opportunity to develop their language and acquire the knowledge about the surrounding world faster.

Table 1. Survey results from "Home Rehabilitation Clinic" – Evaluation of Speech Perception in Children with Hearing Impairments No.7 [2].

Degree of comprehension	Boy 86.54%		Girl 100.00%	
Sound	Realization	Realization (%)	Realization	Realization (%)
a	12/12	100.00%	12/12	100.00%
b	1/1	100.00%	1/1	100.00%
d	1/2	50.00%	2/2	100.00%
g	1/1	100.00%	1/1	100.00%
i	2/2	100.00%	2/2	100.00%
k	2/2	100.00%	2/2	100.00%
l	3/3	100.00%	3/3	100.00%
m	2/2	100.00%	2/2	100.00%
n	1/2	50.00%	2/2	100.00%
o	7/7	100.00%	7/7	100.00%
p	2/2	100.00%	2/2	100.00%
t	4/4	100.00%	4/4	100.00%
u	4/4	100.00%	4/4	100.00%
w	0/1	0.00%	1/1	100.00%
ć t͡ɕ	0/2	0.00%	2/2	100.00%
ń ɲ	0/1	0.00%	1/1	100.00%
ś ɕ	1/1	100.00%	1/1	100.00%
y	2/2	100.00%	2/2	100.00%
z	0/1	0.00%	1/1	100.00%

The logopedic diagnosis of deaf people should answer the following questions:

- Is it hearing loss, residual hearing or complete lack of hearing?
- What is the extent of hearing loss?
- Which sounds are within the field of speech, and which are not?
- In the examined case, is there only a reduction of hearing, or hearing loss in the range of particular frequencies? [7].

Parents, doctors, speech therapists, psychologists, deaf and dumb education experts should work together for the particular purpose of therapy [6]. Rehabilitation of impaired hearing after implantation should include the teaching of speech, removal of voice disorders and difficulties in reading and writing, as well as shaping the child's normal development in the cognitive and socio-emotional sphere.

The rehabilitation program was prepared in view of the assumptions and treatment program for children with a cochlear implant of the Institute of Physiology and Pathology of Hearing and it provides the following levels:

- **primary** – including the detection of sounds and their discrimination
- **ordinary conversation** – including the identification of different sounds, especially speech signals from a closed set, whose subject matter and level of difficulty change with the growing skills of the practitioner,
- **speech understanding** – including speech understanding by hearing in open sets [4].

It should be noted that these levels were achieved in different ways and at different times. It depended on the individual capabilities and limitations of the children. For the girl there was no need for a detailed expansion of the therapeutic process, the indications involved just her further stimulation and enrichment of the child's opportunities to gain the auditory and language experience unknown so far. The most important aspect in the girl's further treatment will be the stimulation of the child's readiness for schooling which is associated with writing, reading, etc.

The situation for the boy will be completely different. This child should spend a lot of time learning the detection of sounds and their differentiation, the identification of surrounding sounds and speech sounds and exercises in perception and auditory memory. The main objective of the tested boy's therapy will be the increasing of his communicative skills.

Therapeutic sessions with children were organized in the form of a variety of games, using the principle of gradation of difficulty and taking into account the capabilities of each. In the case of the boy the above-described rehabilitation plan should be used systematically in various situations of

everyday life both by the child's immediate environment such as family environment and the boy's speech therapist, psychologist or teacher in the kindergarten.

Conclusions

The described children have undergone a cochlear implant system surgery, which allowed them to function better in the "hearing world".

The above-presented case studies indicate that difficulties in the use of speech may occur in the situations of lack of rehabilitation and systematic support of the family environment in which the child with an implant develops.

Diagnosis and speech therapy should take into account the level of speech development and learning opportunities of the implanted children, as well as the close co-operation with the family.

In many cases, the task of a speech therapist is to convince parents that rehabilitation after implantation is crucial for the further social and emotional development of their child. Success in rehabilitation of children after implantation of a cochlear implant system depends largely on the commitment of the family environment in which the deaf child develops.

The situation when we have a stable family where there is high involvement of parents and other family members in the upbringing and development of the deaf child creates very good conditions for cooperation during rehabilitation. This fact is confirmed by the studies in the case of the investigated girl. When the family environment is ailing, educational opportunity for proper and systematic rehabilitation may decrease. An example of this is the considered boy.

In the case of children with difficult family situations, it is crucial that they should be provided with psychological, educational, and speech therapy to compensate for or reduce the disparities of deaf children with their peers.

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