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## DIAGNOSTIC AND TREATMENT METHODS

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## COCHLEAR IMPLANTATION IN THE REPUBLIC SAKHA (YAKUTIA)

The article presents a statistical analysis of children's composition after cochlear implantation carried out in Otorhinolaryngology Department of Pediatric center of Republican Hospital No1 National Medical Center in the period from 2017 to 2019. The results of hearing and speech rehabilitation were obtained according to the scale for assessing the prospects of using children's cochlear implantation and categories of hearing perception were defined as well.

**Keywords:** cochlear implantation, otorhinolaryngology, audiology, rehabilitation, hearing, speech.

**Introduction.** The ability to perceive sound is one of the important features of the human body, which allows us to fully cognize the picture of the world around us. Hearing loss or congenital inability to hear in childhood patients is a serious burden not only in their socialization, but also in the learning process. [11] Attempts to restore hearing have been actively undertaken since the middle of the 20th century. [10]

The ability to restore hearing function in deaf people using direct electrical stimulation of the afferent fibers of the auditory nerve with a multichannel electrode system has become one of the most important achievements of medical science today. [4, 12] Cochlear implantation (CI) is the only method of treating patients with total deafness, which functionally provides intelligible speech perception. [7, 12] The regulatory document that con-

trols the selection of candidates for surgery is the instructional material approved by the letter of the Ministry of Health of the Russian Federation of 15.06.2000 No. 2510 / 6642-32 "On the implementation of criteria for the selection of patients for cochlear implantation, methods of preoperative examination and prediction of effectiveness rehabilitation of implanted patients". The main selection criterion for CI is damage to the majority of hair cells. The selection of children is carried out in accordance with the division of patients into the pre-lingual and post-lingual categories, which have an important prognostic value. [5] For early diagnosis of hearing loss in the Russian Federation, universal audiological screening of newborns and children of the first year of life is carried out, including registration of otoacoustic emission and short-latency auditory evoked potentials. [1, 3] The optimal hearing and speech result in CI, in children with congenital deafness and hearing loss in the first year of life, can be achieved before the age of 3 years, the minimum recommended age is 6-12 months. [5, 8]

As part of the implementation of the decree of the Head of Sakha Republic (Yakutia) dated August 22, 2016 No. 1372 "On measures to improve high-tech types of medical care and innovative treatment methods in Sakha Republic (Yakutia)", as well as the signing of a Cooperation Agreement between the Ministry of Health of Sakha Republic (Yakutia) (Minister Okhlopkov M.E.) and Federal State Budgetary Institution 'National Medical Research Center otorhinolaryngology of the Federal Medical and Biological Agency' of Russia (director Daihes N.A.) in 2017 for the first time performed

cochlear implantation operations in children aged 1 to 2 years. Since 2018, on the basis of Republican hospital No1 National center of medicine, a specialized day hospital has been put into operation to configure and replace the CI speech processors. [9, 13]

After the operation and connection of the implant, a telemetry session and speech processor (SP) settings are conducted in the Day Hospital of Republican hospital No1 National center of medicine at the appointed time. An integrated approach to hearing and speech rehabilitation is observed, in addition to classes with a teacher of speech rehabilitation, speech therapist, psychotherapist, children additionally study at home, according to the recommendations of specialists, with weekly video reports from their parents. [1, 2, 6]

The study of the obtained results of hearing and speech rehabilitation in children is currently very relevant.

**Purpose of the study:** to determine the effectiveness of hearing and speech rehabilitation of children after cochlear implantation, performed on the basis of the ENT department of Republican hospital No1 National center of medicine for the period 2017-2019.

**Materials and methods.** The study was carried out according to the medical records of an inpatient patient and data from the workflow automation system for medical institutions, based on the Day Hospital and ENT department of Republican hospital No1 National center of medicine from 2017 to 2019. The work is in accordance with the ethical principles of conducting scientific medical research with human participation. The parents of each patient signed an authorization

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agreement to conduct a study with the processing of medical and personal data.

We studied 23 medical records of the Day Hospital and ENT department with CT performed for the period 2017 - 2019. Diagnosis and coding of operations are set in accordance with ICD 10 and the Nomenclature of Medical Services. All patients met the selection criteria for CI. All patients were treated in accordance with the Clinical Recommendations of the Ministry of Health of the Russian Federation. All patients have implants of the Digisonic SP "Neurolec" model.

To assess the CI, the "Scale for assessing the prospects for the use of cochlear implantation in young children" was used. The assessment of the state of hearing was carried out according to the CAP scale (Assessment of the category of hearing perception). This scale allows you to determine the category of hearing ability and track the dynamics after the implantation, based on the reaction to sounds or partial / complete understanding of spoken language. Statistical processing of the obtained data was carried out using generally accepted methods of mathematical analysis, using the MS Office Excel 2019 program and the document management system for medical institutions MIS (Medical Informational System).

23 children were operated on in the ENT department in the period from 2017 to 2019. (in 2017 - 11 (47.8%) children, in 2018 - 6 (26%) children, in 2019 - 6 (26%) children)

At the time of the operation, 17 (73.9%) children were 1 to 3 years old, 1 child (4.3%) from 4 to 6 years old, 3 children (13%) from 7 to 13 years old, 18 years old - 2 children (8.6%). Among them there are 14 boys (60.8%), girls (39.1%).

Distribution by nationality: Yakuts - 17 (73.9%) children, Russians - 3 (13%) children, Evenki - 2 (8.6%) children, Tuvinians - 1 (4.3%) children.

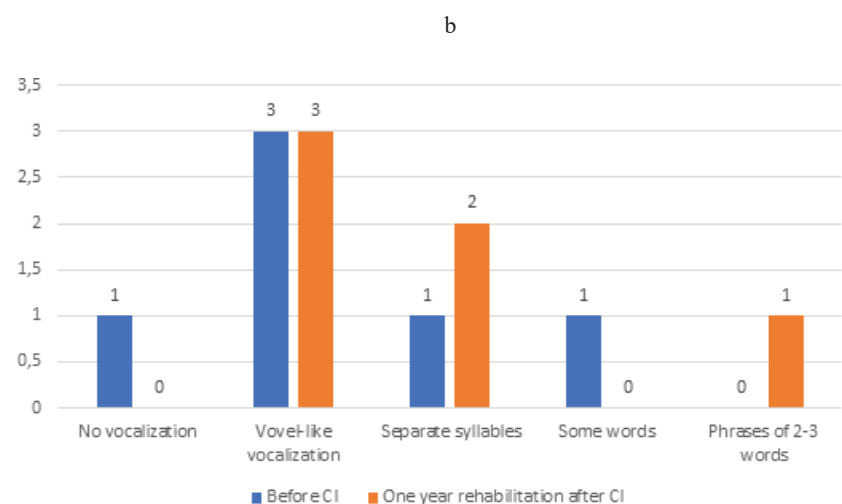
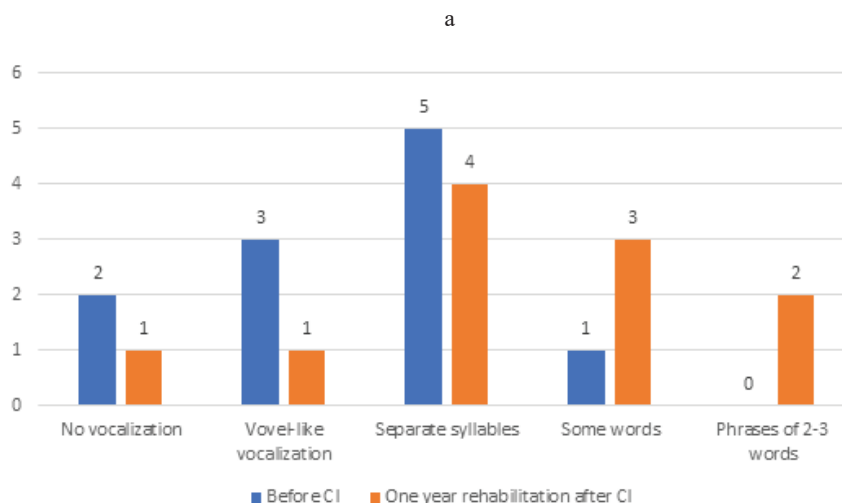
Distribution of patients by place of residence: Yakutsk - 6 (26%) children, uluses - 17 (74%) children.

9 children (39.1%) had severe bilateral sensorineural hearing loss of the IV degree in both ears, bilateral deafness in 13 (56.5%) children, and 1 (4.3%) child had sensorineural hearing loss of IV degree for one ear and deafness to the other. (Figure 1)

According to the etiological factor, the following data were obtained: hereditary predisposition - 4 (17.3%) children (among them 1 child with a confirmed GJB2 gene mutation in 1 child (4.3%)), congenital anomaly in the development

**Assessment of the category of hearing perception (CAP) in patients with CI, abs. number (%)**

Month	Points						
	0	1	2	3	4	5	6
in 2017							
0(first connection)		11(100)					
3		5(45.4)	5(45.4)	1(9.1)			
6		2(18.2)	5(45.4)	3(27.2)		1(9.1)	
9		1(9.1)	3(27.2)	4(36.4)		3(27.2)	
12			2(18.2)	6(54.5)		3(27.2)	
18			1(9.1)	4(36.4)	2(18.2)	4(36.4)	
24				2(18.2)	3(27.2)	5(45.4)	1(9.1)
in 2018							
0(first connection)		5(83.3)		1(16.7)			
3		2(33.3)	3(50)	1(16.7)			
6		1(16.7)	2(33.3)	2(33.3)	1(16.7)		
9		1(16.7)	1(16.7)	3(50)		1(16.7)	
in 2019							
0(first connection)		3(50)	1(16.7)	2(33.3)			



Dynamics of the patients with CI speech: a - in 2017, b – in 2018

of the snail - 1 (4.3%)) a child, suffered from meningitis - 2 (8.7%) children, taking ototoxic drugs - 2 (8.7%) children, with an unspecified etiology of the disease - 14 (60.8%) children. Concomitant diseases were observed in 6 (26%) patients. (Figure 2)

Some patients used super-powerful digital hearing aids before surgery - 7 (30.4%) children. Among them, with experience of using a hearing aid up to 6 months - 3 (42.8%) children, binaural - 4 (57.1%) children, monaural - 3 (42.8%) children.

Side of cochlear implantation: AD - 18 (78.2%) children, AS - 5 (21.7%) children, among them AD / AS - 1 child, the left side was operated at the Federal State Budgetary Institution 'National Medical Research Center otorhinolaryngology of the Federal Medical and Biological Agency' of Russia.

**Results and discussion.** Evaluation of patient selection according to the "Scale for evaluating the prospect of using cochlear implantation in young children" showed that in the study group of patients (23 children) in 19 (82.6%) cases the results were more than 14 points. For children with congenital deafness, a value of more than 14 points indicates that the use of CI is very promising. The remaining 4 (17.4%) cases include children with severe concomitant pathology.

The state of hearing in dynamics according to the CAP scale (Assessment of the category of hearing perception) in children is presented in three tables, for 2017 in Table 1, for 2018 in Table 2 and for 2019 in Table 3.

When assessing the state of speech of children operated in 2017 (11 patients) before cochlear implantation: no vocalization in 2 (18.1%) children, vowel-like vocalizations in 3 (27.2%) children, separate syllables in 5 (45.5 %) children, some words in 1 (9.2%) child. The results of rehabilitation one year after the CT: no vocalization in 1 child (9.1%) due to wearing a tracheostomy tube, vowel-like vocalizations in 1 child (9.1%), separate syllables in 4 children (36.7%), separate words in 3 children (27.2%), phrases of 2-3 words in 2 children (18.1%). (Fig. 3)

In patients operated in 2018 (6 pa-

tients), before cochlear implantation: no vocalization in 1 child (16.7%), vowel-like vocalizations in 3 children (27.3%), separate syllables in 1 child (16.7%), single words in 1 child (16.7%). The results of rehabilitation one year after the CT: vowel-like vocalizations in 3 children (50%), separate syllables in 2 children (33.3%), phrases of 2-3 words in 1 child (16.7%). (Figure 4)

**Conclusion.** In the course of the study, according to the data of the clinical and audiological examination of children, there is a positive trend in the process of hearing and speech rehabilitation. After connecting the SP, children study the sounds surrounding them with great interest, and additionally study with their parents. After starting attending rehabilitation centers, they successfully integrate into society, communicate with peers and relatives. An integrated approach to the treatment of patients with severe sensorineural hearing loss and deafness, including CT and hearing and speech rehabilitation, both in specialized centers and at home, is the most effective method of treatment. The ultimate goal of cochlear implantation is to teach the child to understand the speech, to speak, the ability to socialize and fully integrate into society.

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