



ORIGINAL ARTICLE

## Hearing rehabilitation in cerebral palsy: development of language and hearing after cochlear implantation<sup>☆,☆☆</sup>



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### KEYWORDS

Cerebral palsy;  
Cochlear implants;  
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### Abstract

**Introduction:** Auditory rehabilitation in children with bilateral severe-to-profound sensorineural hearing loss with cochlear implant has been developed in recent decades; however, the rehabilitation of children with cerebral palsy still remains a challenge to otolaryngology and speech therapy professionals.

**Objective:** To verify the effectiveness of cochlear implants in the development of auditory and language skills in children with cerebral palsy.

**Methods:** A prospective analytical study. The evaluation of auditory responses to speech test was applied to the children in this study at regular intervals following implantation. Standardized tests that assess and quantify the development of auditory and language skills were administered and speech therapy video records and speech therapy files were analyzed. All children went through individually tailored intensive audiological rehabilitation programs following cochlear implantation.

**Results:** Two participants had gradual auditory and language development when compared to other participants who reached advanced levels in hearing and oral language classifications.

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*Conclusion:* The use of the Cochlear implant enabled participants to reach advanced stages of hearing and language skills in three of the five participants with cerebral palsy in this study. This electronic device is a viable therapeutic option for children with cerebral palsy to help them achieve complex levels of auditory and language skills.

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## PALAVRAS-CHAVE

Paralisia cerebral;  
Implante coclear;  
Perda auditiva

## Reabilitação auditiva na paralisia cerebral: desenvolvimento da audição e linguagem após implante coclear

### Resumo

*Introdução:* A reabilitação auditiva em crianças com deficiência auditiva neurosensorial severa a profunda bilateral com o Implante Coclear foi consagrado nas últimas décadas, contudo, ainda permanece um desafio para a otorrinolaringologia e a fonoaudiologia a reabilitação do portador de paralisia cerebral.

*Objetivo:* Verificar a efetividade do Implante Coclear no desenvolvimento das habilidades auditivas e de linguagem em crianças com paralisia cerebral.

*Método:* Estudo analítico prospectivo. Foram aplicados testes padronizados que avaliam e quantificam o desenvolvimento das habilidades auditivas e de linguagem. Foram analisadas as filmagens das terapias fonoaudiológicas e os registros descritos ao término de cada sessão de terapia.

*Resultados:* As crianças analisadas apresentaram desenvolvimento auditivo e de linguagem satisfatório quando comparado às demais crianças que alcançaram níveis mais complexos nas categorias de audição e evolução significativa no desenvolvimento da linguagem oral.

*Conclusão:* O uso do Implante Coclear favoreceu o alcance de etapas avançadas das habilidades de audição e linguagem em três das cinco crianças com paralisia cerebral desse estudo. Esse dispositivo eletrônico tem sido uma opção terapêutica viável para que crianças com paralisia cerebral alcancem etapas complexas no que se refere às habilidades auditivas e de linguagem. © 2014 Associação Brasileira de Otorrinolaringologia e Cirurgia Cérvico-Facial. Publicado por Elsevier Editora Ltda. Todos os direitos reservados.

## Introduction

Cerebral palsy (CP) is a non-progressive motor disorder resulting from brain impairment in the early stages of child development. The basic neurological symptoms are characterized by motor disorders that develop over time, causing delay or disruption of sensory motor development, with insufficient postural mechanism, presence of reflexes at times when they should be inhibited, alterations in muscle tone, and incapacity to perform movements.<sup>1</sup>

Possible disorders of higher cortical functions can generate important impact on activities of daily living. Moreover, language acquisition may be delayed and the child with CP may exhibit changes in articulation, speech, fluency, and prosody. Its clinical manifestations may change over the course of development due to brain plasticity, particularly in the immature brain. Due to this plasticity, uninjured areas of the brain can assume some of the functions of the damaged areas.

In addition to motor impairment, other disabilities may be present, such as hearing, visual and cognitive deficits, as well as language, behavioral, and learning alterations.<sup>1</sup>

The literature shows several common etiological agents for both CP and sensorineural hearing impairment.

Among them are congenital infections, hyperbilirubine-mia, prematurity, low birth weight, perinatal hypoxia, and cytomegalovirus, among others.

The cochlear implant (CI) is a high-technology electronic device developed to perform the function of damaged or absent cochlear hair cells, and to provide electrical stimulation of the remaining auditory nerve fibers. The CI does not cure deafness, but provides a sense of hearing with the required quality for the perception of speech sounds.<sup>2</sup>

Currently, the CI is considered a viable therapeutic option in cases of children with CP and severe/profound bilateral sensorineural hearing loss who have not shown benefits with the use of hearing aids.<sup>3-7</sup>

There are other aspects to consider, when other conditions are present in the child in addition to hearing loss. Each disability that is added to the deafness, will present distinct clinical features that will influence both the diagnostic evaluation and the rehabilitation of the hearing impairment. Among other factors, hearing results will depend on the child's potential for his or her overall development.<sup>6</sup>

The most important benefit provided by CI is the possibility of perception of higher frequency speech sounds. This allows the child to recognize speech sounds more easily, and oral language acquisition occurs faster and with less stress.<sup>2</sup>

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