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ORIGINAL ARTICLE

Is there a best side for cochlear implants in post-lingual patients?☆

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KEYWORDS

Cochlear implant;
Hearing;
Speech perception;
Sound deprivation;
Auditory residue

Abstract

Introduction: Cochlear Implant is a sensory prosthesis capable of restoring hearing in patients with severe or profound bilateral sensorineural hearing loss.

Objective: To evaluate if there is a better side to be implanted in post-lingual patients.

Methods: Retrospective longitudinal study. Participants were 40 subjects, of both sex, mean age of 47 years, with post-lingual hearing loss, users of unilateral cochlear implant for more than 12 months and less than 24 months, with asymmetric auditory reserve between the ears (difference of 10 dBNA, in at least one of the frequencies with a response, between the ears), divided into two groups. Group A was composed of individuals with cochlear implant in the ear with better auditory reserve and Group B with auditory reserve lower in relation to the contralateral side.

Results: There was no statistical difference for the tonal auditory threshold before and after cochlear implant. A better speech perception in pre-cochlear implant tests was present in B (20%), but the final results are similar in both groups.

Conclusion: The cochlear implant in the ear with the worst auditory residue favors a bimodal hearing, which would allow the binaural summation, without compromising the improvement of the audiometric threshold and the speech perception.

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PALAVRAS-CHAVE

Implante coclear;
Audição;
Percepção da fala;
Privação de som;
Resíduo auditivo

Existe um lado melhor para implantes cocleares em pacientes pós-linguais?**Resumo**

Introdução: O implante coclear é uma prótese sensorial capaz de restaurar a audição em pacientes com perda auditiva neurosensorial bilateral grave ou profunda.

Objetivo: Avaliar se há um lado melhor para o implante coclear em pacientes pós-linguais.

Método: Estudo longitudinal retrospectivo; incluiu 40 indivíduos, de ambos os sexos, idade média de 47 anos, com perda auditiva pós-lingual, usuários de implante coclear unilateral por mais de 12 meses e menos de 24 meses, com reserva auditiva assimétrica entre as orelhas (diferença de 10 dBNA, em pelo menos uma das frequências com uma resposta, entre as orelhas), divididos em dois grupos. O Grupo A foi composto por indivíduos com implante coclear na orelha com melhor audição residual e Grupo B com menor audição residual em relação ao lado contralateral.

Resultados: Não houve diferença estatística entre o limiar auditivo tonal antes e depois do implante coclear. Uma melhor percepção do discurso em testes pré-implante coclear foi observado no grupo B (20%), mas os resultados finais foram semelhantes em ambos os grupos.

Conclusão: O implante coclear na orelha com pior audição residual favorece uma audição bimodal, o que possibilitaria a soma binaural, sem comprometer a melhora do limiar audiométrico e a percepção da fala.

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Introduction

A Cochlear Implant (CI) is a sensory prosthesis to restore hearing in bilateral severe-to-profound hearing loss if no Hearing Aid Devices (HAD) is effective. CI indications have been expanded to other types of losses due to technological advances related to software, devices and electrodes, and rehabilitation process.

For the indication of CI surgery, a multidisciplinary assessment is necessary, including audiological and imaging tests and etiological diagnosis. These tests are important to predict auditory responses after the speech processor is turned on.¹

CI may be indicated for pre-lingual children with bilateral severe-to-profound sensorineural hearing loss or for post-lingual adults and children.²

Among the individuals with post-lingual deafness, some have audiometry with asymmetrical curves due to better hearing in one ear in comparison to the other and/or received higher asymmetrical hearing stimulus. After Computed Tomography (CT) image analysis and Magnetic Resonance Imaging (MRI) of the inner ear, excluding the indication of the best ear with good anatomical conditions, it is necessary to choose the side to the CI surgery in order to reach the best audiological results.³

Some studies indicate the CI device on the best hearing side with the best "hearing reserve" that represents more spiral ganglion cells surviving.⁴⁻⁶ Despite these considerations, patients who cannot have the bilateral implantation, choose CI surgery in the ear with worse hearing results with hearing aids.

Despite the increased possibility of surgical success on the side with better hearing reserve, it is known that unilateral CI provides monaural hearing, without the possibility of stimulation by a hearing device in the other side, limiting the location and sound discrimination in noisy environments.⁷

Aiming to offer the patient a possibility for binaural hearing, with bimodal adaptation, hearing aid stimulation in one ear and CI in the other one, was recommended by the International Consensus on cochlear implants in 2005 and some surgeons have chosen the side of poor hearing reserve for CI surgery in an attempt to provide hearing with binaural summation.⁸⁻¹⁰

Binaural hearing eliminates the shadow effect of the head, which is the obstruction of the head to the arrival of the sound stimulus when it is presented to one ear only; it provides the squelch effect, which is the ability of the auditory system to use the information from both ears when speech and noise are separated spatially and provides binaural summation as a result of central auditory processing to integrate and use the hearing of both ears.¹¹

The aim of this study is to assess whether there is an indication for the best side for cochlear implants in post-lingual deafness patients.

Methods

The study was approved by the Ethics Committee under number 56931916.8.0000.5440.

A retrospective longitudinal study was conducted using the review of medical records of post-lingual deafness patients undergoing cochlear implant surgery between 2004 and 2014 to evaluate the best audiological response variables such as age at the time of implant, gender, hearing loss time, stimulus time in each ear with hearing aids, sound deprivation time and audiological characteristics of each patient before and after CI were analyzed. To obtain the post-cochlear implant results, audiological results were standardized at the period from 1 to 2 years post-CI.

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