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ORIGINAL ARTICLE

The Cochlear Implant as a Tinnitus Treatment☆

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KEYWORDS
Tinnitus;
Cochlear implants;
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Abstract
Introduction and objectives: Tinnitus is a symptom of high prevalence in patients with cochlear pathology. We studied the evolution of tinnitus in patients undergoing unilateral cochlear implantation for treatment of profound hearing loss.
Methods: This was a longitudinal, retrospective study of patients that underwent unilateral cochlear implantation and who had bilateral tinnitus. Tinnitus was assessed quantitatively and qualitatively before surgery and at 6 and 12 months after surgery.
Results: We evaluated 20 patients that underwent unilateral cochlear implantation with a Nucleus® CI24RE Contour Advance™ electrode device. During the periods in which the device was in operation, improvement or disappearance of tinnitus was evidenced in the ipsilateral ear in 65% of patients, and in the contralateral ear, in 50%. In periods in which the device was disconnected, improvement or disappearance of tinnitus was found in the ipsilateral ear in 50% of patients, and in the ear contralateral to the implant in 45% of the patients. In 10% of the patients, a new tinnitus appeared in the ipsilateral ear.
Conclusions: The patients with profound hearing loss and bilateral tinnitus treated with unilateral cochlear implantation improved in a high percentage of cases, in the ipsilateral ear and in the contralateral ear.

PALABRAS CLAVE
Acúfeno;
Implante coclear;
Hipoacusia

El implante coclear como tratamiento del acúfeno

Resumen
Introducción y objetivos: El acúfeno es un síntoma de elevada prevalencia en pacientes afectados de una cocleopatía. Estudiamos la evolución del acúfeno en pacientes sometidos a implantación coclear unilateral como tratamiento de la hipoacusia profunda.
Métodos: Estudio longitudinal y retrospectivo de pacientes intervenidos de implantación coclear unilateral que presentaban acúfenos bilaterales. Se ha realizado valoración cuantitativa y cualitativa de los acúfenos previo a la cirugía, y a los 6 y 12 meses de la intervención quirúrgica.

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Resultados: Se han valorado 20 pacientes, intervenidos de implantación coclear unilateral con un dispositivo Nucleus® CI24RE con electrodo Contour Advance™. Durante los periodos en que el dispositivo se encontraba en funcionamiento se ha evidenciado una mejoría significativa o desaparición de los acúfenos, en el oído homolateral al implante coclear en el 65% de los pacientes, y en el oído contralateral al implante en el 50% de los pacientes. En los periodos en que el dispositivo se encontraba desconectado; se comprobó una mejoría significativa o desaparición de los acúfenos, en el oído homolateral al implante coclear en el 50% de los pacientes, y en el oído contralateral al implante en el 45% de los pacientes. En un 10% de los pacientes ha aparecido un nuevo acúfeno en el oído homolateral al implante coclear.
Conclusiones: Los acúfenos bilaterales que presentaban los pacientes sometidos a implantación coclear unilateral como tratamiento de la hipoacusia profunda, han mejorado en un porcentaje elevado de los casos tanto en el oído homolateral como en el contralateral al implante.

Introduction

The therapeutic effect of cochlear implantation on previously existing tinnitus in patients had already been noted in the initial moments of the history of the cochlear implant. In 1981 House and Brackmann[1] reported that patients with cochlear implants indicated, after the surgery, an improvement in previously existing tinnitus. Given these results, these authors suggested the possibility of using cochlear implantation procedures for patients suffering severe tinnitus.

In fact, following the diffusion of cochlear implant techniques, numerous authors have pointed out this possibility.

For that reason, we decided to study the influence of cochlear implantation on tinnitus and the possible application of this surgical technique to treat this symptom.

Methods

We studied the influence of unilateral cochlear implantation on bilateral tinnitus existing previously in patients treated with this technique. The assessment was carried out on 20 patients that received unilateral cochlear implantation using a Nucleus® CI24RE implant with a Contour Advance™ electrode.

The aetiology of the hearing loss of the patients under study varied greatly and was unknown in many cases. Consequently, it was difficult to use this information statistically in this study.

The laterality of the surgical procedure (that is, the ear chosen for implantation) was generally independent of the characteristics of the tinnitus suffered by the patient, the decision being based on various anatomical and audiological criteria. Nevertheless, in several cases, the severity of hearing loss in 1 of the 2 sides, in ears having similar anatomical and auditory conditions, determined the ear to implant.

As criteria of inclusion, we used the following: patients of either gender, of an age greater than 15 years; with presence of stable bilateral tinnitus having existed over 2 years; and lacking response to any of the treatments used previously.

As criteria of exclusion, we established the following: the existence of possible organic causes for tinnitus –except for the cochlear pathology itself–; presence of vascular loops, situations of cochlear nerve aplasia or dysplasia; retrocochlear regrowth at any stage of evolution; existence of dysfunction in the temporomandibular joint; and cases of cochlear implantation in which there had been difficulties in inserting the electrode-bearing bundle.

The surgical technique was identical in all cases, inserting the implant to the same depth in all the patients. This intervention was performed by the same surgeons.

To assess our results, we used 2 interviews in addition to the initial medical history. The first interview was carried out 6 months after the surgical procedure and the second, 1 year following the cochlear implantation.

In the initial medical history and the later interviews, tinnitus existing in both ears of the patient was assessed. Likewise, we assessed tinnitus by asking the patient about it with the implant both functioning and disconnected.

To assess the tinnitus qualitatively and quantitatively, we used the modification of the Tinnitus Handicap Inventory (THI)[2] scale proposed by McCombe et al.[3] and visual analogue scale (VAS) respectively.

In the case of qualitative assessment, given that what was involved was bilateral tinnitus for which it was hard for the patient to give a precise estimate, we decided to use the McCombe test. In this test, the patients were asked to include themselves within 1 of the 5 groups proposed by the author, based on their overall sensation.

Quantitative assessment was carried out by surveying the patients about each ear separately. We used a 10-point VAS (basically, a numerical scale between 1 and 10) with which the patients could quantify their tinnitus, in one ear and the other, by simply assigning it a number.

Results

The pre-surgical assessment of the tinnitus existing in the target population, using the THI scale as modified by McCombe et al.,[3] showed that in 5% of the cases (1 patient) the tinnitus was considered severe (Grade 4), while in 10% of the cases (2 patients) it was considered moderate (Grade