

BIAP Recommendation 07/08:

Children candidates for bilateral cochlear implant

Simultaneous or sequential surgery regarding vestibular function

Foreword

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Introduction

The purpose of this recommendation is to assist professionals in deciding on the strategy to adopt for bilateral cochlear implantation in deaf children based on their vestibular function.

Recommendation

Cochlear implants are electronic devices designed to help people with severe or profound hearing loss to perceive sound and understand speech. They are surgically implanted to stimulate the auditory nerve directly. The objective of bilateral cochlear implants is to provide cues for sound localization, speech understanding in noisy environments and thus improve the overall quality of life of hearing-impaired people.

Simultaneous surgery for bilateral cochlear implants in deaf children involves implanting both ears in the same surgical procedure. This approach can have several advantages, including a reduction in overall recovery time and synchronization of the activation of the two cochlear implants. In addition, simultaneous activation of both implants may help the child to become accustomed to binaural perception more quickly, which is essential for sound localization and better auditory comprehension.

In this recommendation sequential implantation refers to 2 surgical procedures separated by a time interval

The decision to perform simultaneous or sequential surgery (and the time interval) for bilateral cochlear implants in a deaf child depends on a number of factors, such as the vestibular status, the child's age, the cause of his or her deafness, residual hearing in both ears, the hearing aid benefit, the general state of health patients, and the recommendations and experience of healthcare professionals specialized in cochlear implants.

One important factor is vestibular function, which must be assessed before any surgery and in all patients (children and adults).

For some years now, the ideal age for implanting a cochlear implant in severely and profoundly deaf children (babies) has been before age of 12 months, i.e. before they can walk independently.

The risk of altering vestibular function permanently is 5% (excluding all cochleovestibular malformations). There are several possible cases, and Biap has a recommendation for each of them:

- There is bilateral vestibular areflexia (Rec 32/01): In this case it is logically legitimate to propose simultaneous bilateral implantation.

- Unilateral vestibular areflexia and hyporeflexia: It is recommended to carry out sequential bilateral implantation: Initially on the side of the areflexic vestibule, then wait until walking is developed and well established before considering contralateral implantation after clearly informing the parents of the risk of damage to the only functional vestibule and its repercussions.

- Bilateral hyporeflexia: It is recommended to carry out sequential bilateral implantation: Initially on the worst side of hyporeflexia vestibule.

- Vestibular function is completely normal bilaterally (meaning VHIT, VNG, Vemps) : The risk of damage to both vestibules becomes statistically lower and can be weighed against the advantages of simultaneous bilateral implantation described above. However, this risk of damaging simultaneously the 2 vestibules and the consequences are not zero. They must be clearly explained to parents.

Therefore, the decision as to adopt a simultaneous or sequential strategy must be taken with the parents.

So, both strategies may be justified.

- There are one or more cochleovestibular malformations identified on radiological examination (mandatory, CT scan/MRI). In this situation, the risk of vestibular damage during cochlear implantation is much greater.

It is therefore systematically recommended to propose a sequential implantation! After the first implantation preferably on the worst vestibular side ear, a new evaluation of vestibular function should be carried out. If this does not show any deterioration in function in the implanted ear, contralateral implantation can be rapidly proposed. If, on the other hand, function is impaired postoperatively (generally accompanied by a series of characteristic signs and symptoms), it is advisable to wait until walking has developed and stabilized.

The decision for contralateral implantation should be taken with the parents after clear information on the risks of bilateral vestibular areflexia, the consequences of which are described in the Rec. Biap 32/01 (Media : Children vestibular examination).

- Children who experience hearing loss as a result of congenital cytomegalovirus (CMV) infection are at an elevated risk of developing vestibular problems due to the nature of the congenital infection. However, there is currently no evidence to suggest that the placement of a cochlear implant (CI) exacerbates this risk of vestibular issues.

From this perspective, it is advisable to consider the timing of the second cochlear implant placement in these cases. It is recommended that the second implant be placed after the child has begun walking, as this milestone indicates a certain level of vestibular system maturation. However, if bilateral areflexia is present before implantation, simultaneous implantations is possible.

- In case of Meningitis (with bilateral intralabyrinthine hemorrhage) or other risk of C-V (# ...) ossification urgent simultaneous cochlear implantation is mandatory.

In any cases of sequential implantation, it is mandatory to maintain hearing amplification in the non-implanted ear (even if there is profound HL) and to keep aware of importance time interval between implantations which should be no more than 18 months (CT06).

It is important to consult a multidisciplinary team, including an ENT doctor specialized in cochlear implants and vestibular assessments.

The risk-benefit balance must be assessed and clearly explained to parents.

All other disabilities (essentially neurological and ophthalmological) must of course be considered in every decision.

Parents must be able to discuss their child's specific situation.

The doctor will assess the child's condition, discuss appropriate treatment options and provide recommendations tailored to the child's situation.

If No vestibular assessment is possible, simultaneous Cochlear implantation should always be avoided in children before developing walking (excepting particular cases such as risks of cochlear fibrosis/ossification).

This recommendation was created and approved in multidisciplinary cooperation between professionals of all audiophonologic disciplines, which are medicine, pedagogy, speech therapy, psychology and hearing instrument audiology.

The original language of this document is *English*.

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