



# Cochlear Implantation in the Elderly

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## Abstract

It is known that hearing loss and cognition disorders are one of the most prevalent affections in the elderly. There is a clear impact of hearing loss on the quality of life of the elderly, compromising social relationships, mental health, motor skills and even the functioning of specific areas of the cerebral cortex. Furthermore, it is also known that hearing losses considered a risk factor directly related to the prevalence of dementia in varying degrees among the elderly. Deafness corresponds to 8% of the potentially treatable-and therefore preventable-factors related to dementia, including Alzheimer's disease. In audiometry, the loss of every 10 dB increases in 1.7 times the risk for the development to dementia. Nevertheless, there seems to be no association between the development of dementia and hearing loss in patients who use hearing aids. However, much of this elderly deaf population will advance in their degree of hearing loss to the point that the use of common hearing aids will no longer be effective, thus becoming candidates for cochlear implants. Age, therefore, should not be a limiting factor for the indication for cochlear implant. One of the major concerns involving surgery in the elderly is the anesthetic risk of a procedure. Aiming to mitigate this condition, a study conducted by our team at the Hospital de Clinic as of the Federal University of Paraná and at the Hospital Paranaense de Otorrinolaringologia verified the feasibility of performing cochlear implant surgery under local anesthesia and sedation, instead of the more commonly used general anesthesia. This study brought to light the possibility, as well as the need, of guaranteeing the safety of the elderly patient and proved that this management is possible without harming the patient or surgical management.

## Case Presentation

Both hearing loss and cognition disorders are among the most prevalent affections in the elderly [1]. Since life expectancy has been gradually increasing in all regions of the planet [2], the concern with both hearing and cognitive functionality of patients is also growing in many aspects, including in the medical literature and in the daily lives of the elderly, whose prolongation of life results in professional and social enjoyment. These subjects garner interest separately and conjunctly, because of the straight connection between them.

As already described in the medical literature, there is a clear impact of hearing loss on the quality of life of the elderly, compromising social relationships, mental health, motor skills and even the functioning of specific areas of the cerebral cortex [3,4]. Specifically considering the neurological condition elderly patients, it is known that hearing losses considered a risk factor directly related to the prevalence of dementia in varying degrees among the elderly [5,6].

As recently published in The Lancet [7], it is estimated that about 157 million people world I we will have been people diagnosed with dementia by 2050. According to this study, it is believed that two thirds of this amount will be concentrated in low or middle-income countries [8], such as Brazil. Therefore, it is of fundamental importance that the potentially modifiable protective or risk factors are known, so that direct actions can be taken and the seal arming numbers are prevented.

It is known that dementia and cognitive disorders are multifactorial conditions, which are under constant reassessment and re adjustment regarding the potential to contribute to cognitive decline. Among all the numerous potentially modifiable risk factors, such as sedentary lifestyle, low education, depression and alcoholism, the hearing loss is the one with the most relevant role. Deafness corresponds to 8% of the potentially treatable-and therefore preventable-factors related to dementia, including Alzheimer's disease. It is known that in audiometry, the loss of every 10 dB increases in 1.7 times the risk for the development of dementia [9]. Furthermore, the reseems to be no association between the development of dementia and hearing loss in patients who use hearing aids [10,11].

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Usually, in studies related to the topic, the definition of hearing loss follows the one determined by the World Health Organization (WHO) [12], which considers hearing deficit as the presence of a tonal average above 25 dB between frequencies 0.5 kHz to 4 kHz in the pure tone audiometry test. The cognitive assessment of patients, on the other hand, is quite variable and takes into account individualized aspects within a global cognitive assessment. It is evident that the diagnosis of dementia involves more than the simple application of questionnaires, however they serve as an excellent tool in the screening of initial conditions or ones that may still be without a proper diagnosis.

Among the various forms of cognitive assessment of patients, the one most applied by the authors of articles linked to our them is the Mini Mental State Examination, or Mini-Mental (MMSE) [4,13]. The MMSE consists of two parts: The first involves guidance, memory and attention, with a maximum score of 21 points; the second evaluates specific skills, scoring up to 9 points. Combining both parts, they total a possible score of 30 points, with higher values being related to better cognitive performance [14]. However, the test has some limitations, depending on the education all even of the person being a valuated; therefore, in some cases, adjustments may be required in the assessment of data [15,16].

As for the assessment of the quality of life of patients, especially for those undergoing orhinolaryngological interventions, the Glasgow Benefit Inventory (GBI) and the Glasgow Health Status Inventory Questionnaire (GHSI) have excellent applicability [17-19]. These questionnaires consists of 18 questions, which aims to asses show the intervention to which the patient was submitted has impacted his health condition in organic, mental and social aspects. Before being applied, the questionnaire must be adapted to the patient, which includes changing the intervention the patient underwent and adding the correct name in each question.

The use of hearing aids as auditory rehabilitation therapy is a consensus and the improvement of cognitive performance in the elderly in those who use them has already been demonstrated in the literature [5,10,20,21]. However, much of this elderly deaf population will advance in their degree of hearing loss to the point that he use of common hearing aids will no longer be effective, thus be coming candidates for cochlear implants. Age, therefore, should not be a limiting factor for the indication for cochlear implant [22].

Evidently, one of the major concerns involving surgery in the elderly is the anesthetic risk of a procedure. Aiming to mitigate this condition, a study conducted by our team at the Hospital de Clinic as of the Federal University of Paraná and at the Hospital Paranaense de Otorrinolaringologia verified the feasibility of performing cochlear implant surgery under local anesthesia and sedation, instead of the more commonly used general anesthesia [23]. This study brought to light the possibility, as well as the need, of guaranteeing the safety of the elderly patient and proved that this management is possible without arming the patient or surgical management. In addition, regardless of the type of anesthesia used, the electrophysiological and auditory results after implantation are equivalent, and it is then possibility safely use this anesthetic modality for the elderly undergoing cochlear implantation [23,24].

## Conclusion

The cochlear implant is known to be one of the great wonders of medicine, and as such, it can and should be used for auditory

rehabilitation in the elderly, with no maximum age limit, as long as the clinical condition is adequate and the cognitive status and family support are compatible with the schedule that will be created in the life of the elderly, due to the numerous speech and language therapies and mappings of the cochlear implant that will be necessary after the surgery. With this understanding on the part of the family and the patient, the cochlear implant in the elderly is a feasible option and should be indicated in cases where conventional hearing aids are not giving the expected results, according to the traditional protocols for indicating surgery.

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