Cochlear Implantation Outcome in Patients with Common Cavity Deformity

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Abstract

Outcomes Objectives: 1) To analyze our own cases and those in published reports involving cochlear implantation (CI) and 2) determine the factors affecting the outcome in patients with common cavity (CC) deformity.

Methods: We reviewed the English and Japanese literature published from January 1995 to December 2013 using the keywords “CC,” “CI,” and “cochlear malformation.” We included cochlear implanted CC patients whose records on the occurrence of cerebral spinal fluid (CSF) gusher, facial nerve stimulation (FNS), the number of inserted and actively used electrodes, and/or hearing levels after CI were available.

Results: A total of 133 ears of 121 cochlear implanted patients with CC were identified from 37 reports, including 5 patients from our institution. The results of individual hearing tests conducted for monosyllable phonemes and words in closed- and open-sets were reported in 13, 27 and 19 patients, respectively. These results showed a variance of 0–87% (mean variance, 55.0 \pm 30.1%), 0–100% (mean variance, 40.8 \pm 38.0%) and 0–80% (mean variance, 36.0 \pm 28.3%), respectively. Closed-set word test scores were better in patients with a greater number of inserted and active electrodes. In addition, a positive correlation was observed between the number of inserted electrodes and the number of active electrodes. Meningitis was encountered in 6 patients, including 3 who had developed meningitis after receiving CI. Out of the 6 patients, 2 were eventually cured. The prognosis of the other patient is unknown. One patient required device explantation to stop recurrent meningitis. CSF gusher and FNS were observed in 31 (32%) out of 97 patients and 17 (17%) out of 34 patients, respectively.

Conclusion: The hearing results varied widely in CI patients with CC. Better outcomes were observed in patients with a greater number of inserted and active electrodes after CI in patients with CC.

Introduction

CC is a type of inner ear deformity, with the cochlear, vestibule, and circular canals formed as a single round cavity. It leads to total deafness in most cases. CI could achieve marked hearing results in some patients, but not everyone.

Also, there are many obstacles on performing CI and using cochlear implants with CC patients. First, the lack of the basal turn of the cochlea makes it difficult for the surgeon to place the electrode stably in the right position. Second, the absence of the partition between the cavity and the internal acoustic meatus could lead to CSF gusher during operation and/or recurrent meningitis postoperatively. Finally, the stimulus from the electrode could cause unexpected facial movements due to the abnormal track of the facial nerve.

What makes the difference between CC patients who achieve satisfactory hearing with CI and patients who do not? In this study, we would like to determine the underlying factors which would lead to better hearing results in CC patients and also clarify the incidence rate and progress of related complications.

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