Long-Term Speech Perception in Children With Cochlear Implants Compared With Children With Conventional Hearing Aids

*A. F. M. Snik, †Anneke M. Vermeulen, †Jan P.L. Brokx, and *Paul van den Broek

*Department of Otorhinolaryngology, University Hospital, Nijmegen, and †Institute for the Deaf, St. Michielsgestel, The Netherlands

Objective: To determine the speech perception of children with cochlear implants.

Subjects and Methods: Speech perception results of seven children with cochlear implants (excellent performers), who showed stable speech recognition scores in the long term, were compared with those of severely hearing-impaired children with conventional hearing aids (reference group). The groups of children were matched according to their mean free-field aided thresholds.

Results: The results of the open-set word recognition test were comparable in the two groups.

Conclusion: If we consider the results of the hearing aid users as the gold standard, the results suggest that speech recognition in selected children with a cochlear implant is close to optimal. Key Words: Cochlear implants—Speech perception.

SUBJECTS AND METHODS

The experimental group comprised seven selected children who were using a Nucleus multichannel cochlear implant (all with an MSP processor and with common ground stimulation). The selection criteria were as follows: acquired total deafness because of meningitis, significant improvements over time were found, and a plateau in speech perception was reached somewhere between 1 and 3 years later (2). Full insertion of the electrode array and consistent aural-oral communication training seemed to be major positive factors for reaching a plateau within this period (2). The present paper deals with speech perception scores of children with cochlear implants who had reached a plateau. A plateau was defined as being present if improvement in the phoneme recognition score on an open-set word recognition test was 5% or less per year (arbitrary value). The relation between the phoneme score and the aided thresholds, when a plateau score was achieved, was studied. For the present study, the results of the open-set recognition test were used because several of the children showed ceiling effects on speech discrimination and identification tests, but not on the open-set word recognition test.

Speech perception tests are widely used to evaluate the progress of children with cochlear implants (1,2) In several children who received cochlear implants at our department and whose cause of deafness was meningitis, significant improvements over time were found, and a plateau in speech perception was reached somewhere between 1 and 3 years later (2). Full insertion of the electrode array and consistent aural-oral communication training seemed to be major positive factors for reaching a plateau within this period (2). The present paper deals with speech perception scores of children with cochlear implants who had reached a plateau. A plateau was defined as being present if improvement in the phoneme recognition score on an open-set word recognition test was 5% or less per year (arbitrary value). The relation between the phoneme score and the aided thresholds, when a plateau score was achieved, was studied. For the present study, the results of the open-set recognition test were used because several of the children showed ceiling effects on speech discrimination and identification tests, but not on the open-set word recognition test.

Address correspondence and reprint requests to Dr. A. F. M. Snik, Department of Otorhinolaryngology, University Hospital, P.O. Box 9101, 6500 HB Nijmegen, The Netherlands.
RESULTS AND DISCUSSION

In Figure 1, the most recent phoneme scores (obtained at least 3 years after implantation) of the seven children with cochlear implants are presented as a function of the average aided thresholds valid at that time. High phoneme scores were found (mean value 82%). The same figure also presents the results of the group of hearing-aid users. Surprisingly, the phoneme scores of the children with a cochlear implant were similar to those of the children with conventional hearing aids.

In principle, speech perception at conversation level is related to the aided thresholds. If we accept the relation between the phoneme score and aided thresholds of the hearing aid group as the gold standard, it can be concluded that the aided threshold levels seem to be the main cause for the plateau in speech recognition performance in “good” cochlear implant performers.

It can be disputed whether our group of hearing aid users is representative. Lamore et al. (4) determined the relation between phoneme scores and hearing loss in a group of adolescents with severe postlingual hearing impairment (n = 32). If we compare the measured phoneme scores of our children with hearing aids with the values derived from the study of Lamore et al., an average difference of only 3.1% (SD 9.4%) is found, which is negligible. This suggests that our reference data are adequate.

CONCLUSION

Long-term speech recognition scores in children with a cochlear implant may reach a plateau, which seems to be caused by the aided hearing threshold levels.

REFERENCES