Adhesive Anchored Prosthesis (AAP) may improve memory function in patients with Single Side Hearing Loss (SSHL): a pilot study

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Material and Methods:

A prospective study was conducted in the Cochlear Implantation Center of the Santonubo Hospital, Naples, from June to December 2001. The study was conducted in accordance with the declaration of Helsinki and institutional IRB regulations.

10 children (6 male and 4 females, age range 4 to 14 years old, average age 10.4 years) with SSD and mild to severe SSHL and normal hearing threshold in the contralateral ear were enrolled into the study.

Subjects were assessed three times, first without hearing aid (NoHeAi), then right after the application of AAP (AdHe T0), and finally after 7 days (AdHe T1). During each evaluation session, subjects were administered tests of speech perception, dictation and memory function. As for memory function, working memory and short-term memory function were assessed. Speech perception was evaluated with the Common Evaluation Protocol: Rehahilatical Auditory Evaluation (CERP-RAE). Working memory and short-term memory were evaluated respectively with the visual span test and the non-sense word repetition test, both from the PROGMA battery of tests [12]. Working memory was performed in quiet and noise (cocktail party) noise conditions [13]. Short-term memory was tested in the quiet condition. Both speech and dictation tests were performed with an inter-subject range (intra-subject tests) were evaluated by calculating the individual subject’s percentage changes in the scores of the above tests from NoHeAi to AdHe T0 and AdHe T1.

Results:

All children showed an improvement in the speech perception, dictation, short term and working memory function tests at AdHe T0 compared to NoHeAi. No significant differences were found in the scores of children with mild and severe SSHL (p = 0.4).

In the speech perception test, there was a significant difference between AAP and NoHeAi scores (p = 0.05), with an average gain at AAP compared to NoHeAi of 40.3%. Children improved their scores of 31% (p = 0.02) and 51% (p = 0.03) in the silence and noise condition, respectively.

In particular, compared to NoHeAi working memory scores at AdHe T0 improved by 33% (p = 0.007) and 58% (p = 0.001) in the silence and noise condition, respectively; short term memory scores at AdHe T0 improved by 17% (p = 0.006). Table 2 summarises the subject’s individual gains at AAP.

By comparing the children at AAP T0 versus NoHeAi, we did not observe statistically significant differences in the results between the mild and severe forms of SSHL. The comparison of AAP T0 versus NoHeAi showed an average improvement of 4% in speech perception (p = 0.7); an average improvement of 19% and 32% in the dictation test score in the silence (p = 0.03) and noise condition (p = 0.0), respectively; an average improvement of 22% and 32% in the short-term memory test score in the silence (p = 0.1) and noise condition (p = 0.03), respectively; an average improvement of the short term memory test score of 14% (p = 0.03). Table 4 and 5 summarise the subjects’ individual improvements at AAP T0 compared to NoHeAi.

Table 1: Results of speech perception and dictation test for individual subjects (AAPT0 vs NoHeAi)

Table 2: Results of working memory and short-term memory tests for individual subjects (AAPT0 vs NoHeAi)

Table 3: Results of speech perception and dictation test for individual subjects (AAPT0 vs NoHeAi)

Table 4: Results of working memory and short-term memory tests for individual subjects (AAPT0 vs NoHeAi)

Conclusions: AAP might be helpful in the treatment of SSHL. By restoring bilateral hearing, it improved speech perception, speech recognition as measured by the dictation test, and memory function.