A comparison between patients using cochlear implants and hearing aids. Part II: Results on a self-rating scale

Agelfors, E.

journal: TMH-QPSR
volume: 37
number: 1
year: 1996
pages: 077-081

http://www.speech.kth.se/qpsr
A comparison between patients using cochlear implants and hearing aids.

Part II: Results on a self-rating scale

Eva Agelfors

Abstract

Two groups of patients participated (the same as in Part I). Fifteen subjects with a profound hearing loss (PTA 89.4 dB) used hearing aids (HA) and fifteen subjects used cochlear implants (CI), either a single-channel extracochlear implant or a multi-channel intracochlear implant. To obtain information about their difficulties in everyday communicative environments, the subjects rated themselves on a scale of 0-6 (never-always) on 74 items. A multi-category self-rating inventory specifically for persons with profound and severe hearing loss (PIPSL) was used, developed by Owens & Raggio (1988). The results obtained from the speech reception data (Part I) showed a great variation among the subjects. In the Connected Discourse Tracking test (CDT), without support of lipreading, the HA-group received a higher mean benefit from their conventional hearing aid compared to the mean for the CI-group. The mean results obtained on the self-rating inventory scale showed no difference between the two groups for the category “Understanding Speech With No Visual Cues”. The mean scores obtained for the categories “Intensity, Environmental Sounds” and “Understanding Speech With Visual Cues” were higher for the CI-group.

Introduction

The introduction of cochlear implants and improvements in hearing aids and tactile devices have resulted in the need for a subjective evaluative scale that would focus on the communicative difficulties of persons with severe to profound losses. For this purpose, a Performance Inventory for Profound and Severe Loss (PIPSL) has been developed by Owens & Raggio (1988).

It is well known that a conventional pure-tone audiogram and speech reception data are insufficient for describing the actual difficulties experienced by hearing-impaired individuals in everyday communicative environments (Alpiner, 1982). Therefore, the test battery in this study consisted of two parts: speech perception tests (Part I) and a self-rating performance inventory for profound and severe loss (PIPSL).

The aim was to get some insight into the subjects’ difficulties in everyday listening situations compared to their results on the speech perception test. The subjects were asked to rate themselves on a 7-point scale “always–never” on a questionnaire with 74 items.

PIPSL

This inventory presents a series of questions describing a variety of everyday listening situations, totally 74 questions. If the situation described is not in the subject’s experience repertoire, the subject marks the item “Does not apply”. The subjects are asked to judge on a 7-point scale how much difficulty they would have hearing in these situations (wearing the hearing aid or the implant). The 7-point scale ranged from “always” to “never” and an “always”-response for an item corresponded to high performance, whereas “never” indicated poor performance. Items from all categories except occupational items were randomized on a printed form. The occupational items were placed together at the end of the questionnaire. Mean scores obtained for the categories are then arranged in a profile for each subject.

For scoring and statistical summaries, numbers 0 to 6 are assigned to the following seven descriptive responses:

<table>
<thead>
<tr>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
<td>6</td>
</tr>
<tr>
<td>Practically always</td>
<td>5</td>
</tr>
<tr>
<td>Frequently</td>
<td>4</td>
</tr>
<tr>
<td>About half the time</td>
<td>3</td>
</tr>
</tbody>
</table>
Occasionally 2
Practically never 1
Never 0

Items were assigned by Owens & Raggio to one of six categories labelled:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding Speech with Visual Cues (USV)</td>
<td>15</td>
</tr>
<tr>
<td>Understanding Speech with No Visual Cues (USNV)</td>
<td>8</td>
</tr>
<tr>
<td>Intensity (INT)</td>
<td>10</td>
</tr>
<tr>
<td>Environmental Sounds (ES)</td>
<td>8</td>
</tr>
<tr>
<td>Response to Auditory Failure (RAF)</td>
<td>9</td>
</tr>
<tr>
<td>Personal (PER)</td>
<td>8</td>
</tr>
<tr>
<td>General (GEN)</td>
<td>16</td>
</tr>
</tbody>
</table>

Results from the General items (GEN) are omitted in this evaluation when the items are dealing with individual rehabilitation and occupational questions.

Questions in the Understanding Speech with Visual Cues (USV) category sampled the ability to follow connected speech when the speaker's face could be seen. (For example, “You are at a fairly noisy restaurant talking face-to-face with a male friend or family member. Can you understand what he is saying?”). The Intensity (INT) category dealt with the detection of everyday sounds and their relative loudness, whereas Response to Auditory Failure (RAF) inquired how the respondents coped with breakdowns in communication. Items labelled Environmental Sounds (ES) described the task of identifying familiar sounds that can be heard but whose source could not be seen. Similarly, responses were based on audition alone in Understanding Speech with No Visual Cues (USNV). Personal (PER) items tapped respondents' feelings about their hearing impairment.

A Swedish translation of the PIPS-L was used (Poucette et al., 1993). All subjects answered the questionnaire at home at the end of the test period.

Statistical procedures

Pearson product-moment correlations were used to analyse the associations with other measures used. Student's t-test (unequal variance) was used to evaluate between group differences, and t-test for paired sample was used within the groups but between test conditions.

Results and discussion

Mean score obtained from the subjective test (PIPS-L), describing a variety of everyday listening situations are shown in Figure 1. The mean score obtained from the scale for each category showed that there were significant differences between the two groups of subjects in their performance to detect intensity information (INT p<0.01) and to identify environmental sounds (ES p<0.05). There was a correlation between these two scales for the HA-users (r=0.8) and for the CI-users (r=0.4). The mean score for the CI-group was rated “Frequently”, while the mean score for the HA-group was rated “About half the time”.

The mean score for items concerning USV was rated around “About half the time” by both groups of subjects. The mean responses for USNV corresponded to “Practically never” which shows their difficulty in understanding speech when visual cues not are available. The RAF-category with a mean of 4.1 for both groups corresponding to “Frequently” shows that these subjects are fairly active in coping with their difficulties. The PER-category concerning feelings about their hearing impairment showed a small but significant difference (p<0.05) between the groups. This difference could maybe be explained by the new life situation for the CI-group.

To obtain more information about any differences in their subjective rating between the “better” and the “poorer” subjects, the HA/CI-users were divided into two groups, based on their ability to perceive speech auditory alone on the Connected Discourse Tracking (the same as in Part I). Mean scores for the categories INT, ES, USV, and USNV rated by the different groups of subjects CI(+-) and HA(+-) are presented in Fig. 2.

The results showed that there were no differences obtained for the categories Intensity and Environmental Sounds for the two CI(+-) groups. The results corresponded in average to “Frequently”. The mean scores for the HA-users corresponded to “About half the time” by the HA(+) and “Practically never” by the HA(-). The mean results for the USV-category, which sampled the ability to follow connected speech when the speaker's face could be seen, showed no differences between the CI (+/-) groups and the HA(+) group. Their mean responses corresponded to “About half the time”. The mean result rated by the HA(-) group corresponded to “Occasionally”. Note that the items concerning speech includes one to several speakers in a quiet or in a noisy background. The scores
obtained by the subjects for the USNV-category showed that the results rated by the CI(+) corresponded in average to "Occasionally" and CI(-) and HA-users corresponded in average to "Practically never".

Fig. 1. Mean scores for the six categories of the Performance Inventory for Profound and Severe Loss rated by the HA/CI-users. Higher scores indicate better performance.

Fig. 2. Mean scores for four of the categories of the Performance Inventory for Profound and Severe Loss rated by four groups of subjects CI(+/-) and HA(+/-). Subjects who obtained on Connected Discourse Tracking (CDT) more than 20 words/min, are labelled (+).
Figure 3 shows individual PIPSL-scores from the USV-category and the results on the speech tracking test (CDT) in the audiovisual situation. All items used here were about speech understanding with visual cues in communication with one person in quiet background, which corresponds to the same condition as in the CDT-test. There is apparently an interesting difference between the HA-users and the CI-users. On the CDT-test, the HA-group gets a slightly better result. From Figure 1, however, it seems that they experience their situation as more difficult in everyday situations. Almost all ratings on the USV-category used here are concentrated around "About half the time" for the HA-users. For the CI-users, most of the ratings are concentrated around "Practically always". There might be several explanations for this difference. The HA-users might have a more pessimistic view on their everyday situation. The CI-users have recently experienced a dramatic improvement in their quality of life. This might result in a more optimistic view on the communication situation that influence their answers on the PIPSL.

Outcomes from adult cochlea implantation in UK 1990-1994 (Summerfield & Marshall, 1995) have reported that patients with multi-channel devices displayed greater improvements than patients with single-channel devices. When they asked patients retrospectively to judge the change in quality of life resulting from implantation, 96% judged that their quality of life had improved. Other outcomes from the same report are that changes in quality of life reported by patients with multi-channel implants are greater than those reported by moderately impaired patients managed with hearing aids. It is, however, also possible that the difference, which is shown in Figure 3, is explained by the difference on the factor "Intensity" in the PIPSL, shown in Figure 1 and 2. In everyday life, speech intensity varies from situation to situation. The cochlear implants compensate for this difference with the result that CI-users manage much better in everyday communication situations. As can be seen in Figure 3, five of the subjects (three HA-users and two CI-users), scored around 30 words/minute on CDT, audiovisually. Three of them ticked "occasionally" on the PIPSL. Two of the HA-users are today successfully CI-operated and the CI-user (CI:3) became a non-user, which could be explained by a long duration of deafness prior to implantation. Two of the subjects rated "frequently", but scored around 30 words/minute on CDT. Both of them are poor lipreaders, but obtain some improvements with their devices. One of the CI-users ticked "occasionally" on PIPSL but scored very well on CDT, around 60 words/minute. His poor result on PIPSL may be explained by his temper.
and his annoyance with the external equipment. This subject has now been equipped with a new speech processor.

**Conclusion**

Subjective and objective tests of speech communication abilities measure different things. The results obtained from the speech reception data (see Part I) showed a great variation among the subjects. In the CDT-test without support of lipreading, the HA-group received a higher mean benefit from their conventional hearing aid compared to the mean for the CI-group. The mean results obtained on the self-rating inventory scale showed no difference between the two groups for the USNV-category. The mean scores obtained for the INT- and ES-categories were higher for the CI-users. The means for USV-category were scored around "About half the time" by the CI-users and by the HA(+) users. The mean scores obtained by the HA(−) were found to be practically zero for the categories INT, ES and USNV. The study shows that subjective measurements experienced by hearing impaired can serve as useful complement for describing the actual communicative difficulties in everyday situations.

**Acknowledgment**

The author would like to express her gratitude to the subjects who participated in this study and to Marja Vainio, Department of Audiology, Södersjukhuset (Söder Hospital), Stockholm, for her cooperation. Portions of this study has been presented at the European Conference on Audiology, Noordwijkerhout, The Netherlands, 1995 (Proceedings).

**References**


