BILATERAL COCHLEAR IMPLANTATION IN CHILDREN AND ADULTS
BENEFIT OF THE SECOND CI

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ALEXORL 2010

HATPESE: QUEEN OF DECISIONS
AlexORL 2008

HATPESE
Hearing loss
Age at implantation
Type of implant
Ear to be implanted
Parents motivation
Support & maintenance
Education, rehabilitation

… of course you recognize famous HATCHEPSUT
HATEPSE: QUEEN OF DECISIONS
AlexORL 2010

Hearing loss of 2nd ear
Age at 2nd implantation
Time intervall to 2nd CI
Evenly programmed
Parents motivation
Speech processor
Education, rehabilitation

...Hatschepsut again – she should keep you focused

THE CI PROGRAM IN BERN

463 cochlear implants
86 Nucleus CI
261 subjects „active“ in our program
116 bilateral CI users
92 babies, children & adolescents
23 adults

AGE @ COCHLEAR IMPLANTATION
increasing numbers in babies & young children, as well as in adult elderly
increasing numbers include increasing subjects, bilateral CI recipients and revision surgery
APPROVED INDICATIONS 1

The board of Audiology and Experts for hearing aids →
Swiss Federal Office of Social security, Nov 2003

- bilateral profound congenital deafness
- prelingually acquired deafness
- no adequate reaction on auditory stimulation in best aided condition
- suitable anatomical and surgical conditions in both ears
- physical & psychological condition to benefit from two CI
- Likelihood to develop open speech perception

APPROVED INDICATIONS 2

Comment
- Surgery is suitable as a one stage procedure, especially in meningitic deafness
- second implantation should be within one year, no later than 10 years after 1st CI
- Bilateral CI in postlingually deafened children and adults may be indicated, if subjects with only one CI cannot make use of spoken language sufficiently and therefore integration in their professional life is jeopardized.
OUTCOME OF THE 2nd CI IN BILATERAL CI LISTENERS

- Retrospective study on charts of bilateral CI users implanted sequentially with a 2nd CI between 2000 and 2009
- Included are children and adolescent with data on speech audiometry
- Scores of their speech perception abilities were measured with Freiburg multisyllabic numbers and Freiburg monosyllabic words.

- This study is focused on speech perception scores obtained with the 2nd CI alone.

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\[ \Delta \text{(years)} @ 2\text{nd CI} \]

- Large sample of late implantees with 2nd CI
- Many subjects received their 2nd CI simultaneously or in between 12 months

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SEQUENTIAL BILATERAL CI 1

SHORT TIME INTERVAL BETWEEN 1st AND 2nd CI

• Congenital profound deafness, LIMITED benefit of amplification where the hearing aid will be continuously used at first
  – 2nd CI as soon as fitting is accomplished and „hearing“ with the 1st CI exceeds amplified hearing with hearing aid

• Congenital profound deafness in patients where simultaneous bilateral surgery was not suitable for these reasons: time limit in infants, OMC, ossified basal turn

SEQUENTIAL BILATERAL CI 2

LONG TIME INTERVAL BETWEEN 1st AND 2nd CI

• Children, adolescents: cases, where 2nd CI was not available, high motivation to follow rigorous rehabilitation

• Congenital profound deafness, USEFULL LIMITED BENEFIT of amplification where hearing aid was continuously used
  → 2nd CI when hearing aid ear drops to no more useful hearing … individual decision in every case
When 2\textsuperscript{nd} CI became available, increasing request.

Majority of children: 2\textsuperscript{nd} CI in 1\textsuperscript{st} year after the 1\textsuperscript{st} CI.

A closer look at the small group of late recipients of the 2\textsuperscript{nd} CI is an important aspect for counseling in programs where the option of a 2\textsuperscript{nd} CI will be introduced.
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HIGH PERFORMING STARTERS

8 subjects

HIGH PERFORMING CLIMBERS

7 subjects

2nd CI performing a little less good in most users
Girl: reduced use of 2nd CI
Girl: rejected use of 2nd CI
LOW PERFORMERS

6 adolescent bilateral CI users

<table>
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<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>test</th>
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<tr>
<td>% correct</td>
<td>100</td>
<td>80</td>
<td>60</td>
<td>40</td>
<td>20</td>
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QUESTIONNAIRE: PARENTS

E. KHAN HALLER, M. VISCHER 2004

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<tr>
<td>Responds to name without visual contact</td>
<td>14</td>
<td>3</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Looks in the right direction when called</td>
<td>4</td>
<td>12</td>
<td>1</td>
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<td>Looks at sound source quicker</td>
<td>3</td>
<td>9</td>
<td>2</td>
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<tr>
<td>Realizes sound source earlier</td>
<td>7</td>
<td>9</td>
<td>2</td>
<td>0</td>
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<tr>
<td>Participates in conversation, asks questions</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td></td>
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<tr>
<td>Social contacts to other subjects</td>
<td>8</td>
<td>4</td>
<td>5</td>
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<td>Participates in conversation in the car while driving</td>
<td>9</td>
<td>6</td>
<td>2</td>
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<tr>
<td>Understands language in the dark</td>
<td>8</td>
<td>7</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Better orientation in space</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Less exhausted after school</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td></td>
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<tr>
<td>More interested in stories and songs</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>5</td>
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QUESTIONNAIRE: COMMUNICATION
E. KHAN HALLER, M. VISCHER 2004

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<td>More spoken language</td>
<td>9</td>
<td>5</td>
<td>1</td>
<td>3</td>
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<td>Spoken language better understood</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Makes longer sentences</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Speaks softer</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Speaks faster / more fluent</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Reports more often spontaneously on events</td>
<td>12</td>
<td>3</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Understands messages better</td>
<td>8</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Understands without lip reading</td>
<td>9</td>
<td>7</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Spoken language is the prime mode of communication</td>
<td>13</td>
<td>3</td>
<td>1</td>
<td>1</td>
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<tr>
<td>able to use telephone without help</td>
<td>7</td>
<td>5</td>
<td>3</td>
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CONCLUSIONS

- Very convincing benefit in speech perception from 2nd CI in sequentially implanted children and adolescent cochlear implant users even after > 10 years.

- Postlingual hearing loss - either progressive or acute - is a very favorable condition for 2nd cochlear implantation no mater how long after the 1st CI.

- Benefit in speech perception from the 2nd cochlear implant will in general not exceed benefit from the 1st CI.
PREDICTIVE FACTORS

For the benefit of the sequentially implanted children & adolescent:

- expect good to very good benefit from 2nd CI in subject with high performance in the 1st CI, high motivation to train the 2nd ear, no concomitant disease
- expect good to very good benefit from 2nd CI in subject who used hearing aid – no matter how low their discrimination was
- Expect low or very moderate benefit in CI users with low performance with the 1st CI.
- … and there are exceptions