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Bilateral cochlear implant

Morsnowski, A., Müller-Deile, J.

Department of Oto-Rhino-Laryngology, Head and Neck Surgery, Christian – Albrechts –
University of Kiel, Germany

Introduction: Unilateral cochlear implantation offers patients the opportunity to achieve sufficient speech recognition in quiet. For these patients speech reception in noise and localisation are still challenging tasks. Bilateral implantation can enhance these issues significantly, but usually the patients have to learn to extract interaural properties and differences of the bilateral input.

Aim: Binaural and monaural performances of bilateral cochlear implant (CI) recipients were tested before and repeatedly after implantation of the second CI to characterise the progress of bilateral hearing capabilities.

Method: Speech recognition in noise is tested monaural and bilateral with the Oldenburg sentence test or the Oldenburg children rhyme test, depending on the performance and age of the patients. Signal (S) and noise (N) are presented from the front (S0N0) and from separated locations from left and right (S-45°N+45° , S+45°N-45°). The signal-to-noise-ratio is determined for which 50 % of the test items is achieved (SRT) with an adaptive procedure. Localisation abilities are tested at three different levels of complexity: 1) Lateralisation is requested in a setting with three loudspeakers (in front, on left and right). 2) Localisation with seven loudspeakers in the frontal horizontal plane. 3) Localisation with twelve loudspeaker in the full horizontal plane. The task is more interesting for children with soft toy animals sitting on top of the loudspeaker and the children tell which animal speaks.

Results: First results of ongoing clinical monitoring are presented of 17 adults and 40 children with bilateral CI. The time between first and second implantation varies from 0 to 13 years. The bilateral hearing abilities show three types of progress: patients with binaural significant improvements shortly after implantation of second CI, those with improvements of slow progress and those with long remaining poor binaural performance.

