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A program of vestibular system stimulation and its significance for speech development in children with a cochlear implant

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There is a documented bibliography on the benefits of cochlear implants (CIs) in the area of speech perception as well as linguistic competence, which means the ability to use language in an effective and suitable way in accordance with the situation. This competence depends on biological skills (perception and completion processes) and communicative brain actions (intellectual abilities). The neurophysiological analysis of development processes in children (hearing or hearing impaired) clearly indicates links between the level of language development and motor functions within the scope of motor skills. It is an indisputable fact that speech production is a physical act connected with motor activity. The majority of researchers about the functioning and abilities of the vestibular system of people with CI, focus on neuromuscular control represented by the ability to keep balance. However, data about the influence of CI on psychophysical functions aren't clear.

Our paper shows the results of conducted research about intensive training during rehabilitation camps. Our purpose was to check if the improvement of motor skills has any connection with the speech development of children with CI, 17 children with profound hearing loss with CI aged from 4.2 to 10.1 (M=6.7±1.7), with their parents and therapists, were the participants of a camp organized by the Association of Parents and Friends of Deaf Children in Krosno, Poland. The children were tested by pre- and post-test: body control, spirometry, balance skills. The level of linguistic competence was assessed as well as birth potential (Appar). Every day, for 2 weeks, apart from all the planned speech therapy, there was a set of general movement exercises (directed at the vestibular system). The results of the post-test showed the increase in correlation between static, dynamic equilibrium and the results of test that assess linguistic competence. Appar scale, and age (R=0.4 does 0.9). It has been proven that there is a significant presence of relevant neurophysiological bonds in the scope of development of balance and language skills. The results of this pilot research indicate the necessity of further continuous research in the field of coordination motor abilities (GMA) as well as in terms of the development of linguistic and communicative competencies. Practical implication is to recommend for young hearing-impaired children speech therapy combined with movement activities.

Free Paper Session 15 | Bone conduction devices

ADHEAR, the adhesive bone conduction system: Principles and applications

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Background: The development of the adhesive bone conduction system was driven by a vision to offer an acceptable non-invasive bone conduction solution for all those who are reluctant to or who cannot have implant surgery. There is a significant need for a well-functioning non-surgical bone conduction device for bilateral and unilateral conductive hearing losses, especially in pediatrics. The new concept is based on a unique small disposable adhesive adapter attached to the skin behind the pinna. An ear level audio processor can be connected and disconnected to the adhesive adapter.

Material and methods: The fundamental physics and principles behind the adhesive bone conduction system will be discussed. In collaboration with clinics and universities the audiomeric performance and clinical outcome have been investigated. Audiomeric evaluation of the concept was performed by measuring hearing thresholds with the adhesive bone conduction system compared with the established softband solution for bone anchored hearing aids. The clinical experience included both audiomeric evaluation and subjective evaluation with for example Glasgow Children's Benefit Inventory.

Results and conclusions: The adhesive bone conductor offered similar hearing stimulation as the established solution. The new system offers significant advantages in terms of wearing comfort and aesthetics since it does not include any pressure against the skin and no bulky headband arrangement is required. The Glasgow Children's Benefit Inventory, shows that the adhesive bone conduction system is a user friendly and efficient device with high scores on benefits and user satisfaction. The patients are now using it on a regular basis and the first patients that were fitted have now used the concept for more than three years. As for any ear level bone conduction concept where the vibrations are damped when being transmitted through the skin, this type of ear level concept is primarily intended for bilateral and unilateral conductive hearing losses and not for more severe mixed hearing losses.