[Evaluation of an electrode design for the combined electric-acoustic stimulation]

BACKGROUND: The objective of this study was to assess the intracochlear position and the extent of trauma to cochlear structures using the C40(+) M electrode (MED-EL, Innsbruck, Austria), which was especially designed for the combined electric acoustic stimulation. METHODS: Five human temporal bones were implanted using a standard cochlear implant procedure featuring mastoidectomy, posterior tympanotomy, and promontory cochleostomy. For the cochleostomy, an inferior approach with preservation of the endosteum of the cochlea was used to contribute to hearing preservation in the in vivo condition. RESULTS: All insertions of the new electrode array were performed into the scala tympani of the cochlea. The average insertion depth was 288 degrees. Apically, 4 of the 5 implantations were completely atraumatic. One bone showed a rupture of the basilar membrane only at the tip of the electrode. However, 4 of the 5 arrays produced severe trauma to basal cochlear structures. Two pathomechanisms, the direct traumatization through drilling of the cochleostomy or the indirect traumatization via buckling of the array could be distinguished.

CONCLUSIONS: Due to the reduced contact spacing and its flexible body, the C40(+) M electrode is suitable for cochlear implantations with hearing preservation and combined electric and acoustic stimulation of the auditory system. Modifications of the
surgical pathway to the cochlea should help to minimize the risk of basal cochlear trauma.