**Morphology of the Cochlea and its Relevance for an Individualized Cochlear Implantation**

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**Background:**

The software *OTOPLAN* allows a measuring of the cochlear duct length (CDL) with preoperative CT-scans. Since a broad distribution of CDL is known from several studies, an individualized choice of the electrode length is discussed and possible with *OTOPLAN*. Interestingly, in the era prior to *OTOPLAN*, we have been observing incomplete insertions of electrodes rarely. In the present study, a retrospective CDL-analysis of patients, who had received a *MED-EL* electrode, was performed, and correlated with the choice of electrode chosen by the respective cochlear implant surgeon.

**Design:**

Retrospective analysis of a total of 383 consecutive patients, who received a *Flex-28*-electrode (n=246), *Flex-soft*-electrode (n =128), or a CMD device (*Flex 34*; n=9) in cases of extremely long cochleae in one tertiary institution. The following parameter were calculated with the software *OTOPLAN* version 2, and compared between the three groups: CDL, A-value, B-value, height, cochlear coverage, and angular insertion depth.

**Results:**

In all patients the insertion of the electrode was complete and showed no tip-fold over. The CDL was similar between *Flex-28* (35.2 ± 1.9 mm) and *Flex-soft* patients (34.4 ± 1.8 mm); *Flex-34* patients showed a significant longer CDL (38.3 ± 2.0 mm; *p* < 0.001). Despite a complete insertion in all patients, verified with a postoperative *Stenvers* x-ray, cochlear coverage of a total of 2 windings (=720°) was neither reached in the *Flex-28* (564 ± 61°; 68,8 ± 6,9%), nor in the *Flex-31* (637 ± 35°; 77,2 ± 3,9%), nor in the *Flex-34* group (681 ± 67°; 77,7 ± 3,9%).

**Conclusion:**

In particular American cochlear surgeons report of complicated insertion of longer electrode due to various reasons (see Es-Said, *LION*-Broadcast May 2018: “I use shorter electrodes, maximum of 28 mm. Longer electrodes are more difficult to insert, in which I do not always succeed.” Our data show, that the experienced cochlear surgeon succeeded in choosing the right electrode with just estimating the length on the CT-scan, and without an exact measuring of the CDL. Thus, a complete insertion without kinking was achieved. Through the OTOPLAN analysis the clinical view was verified and longer cochleae identified. OTOPLAN enables the young striving ear and cochlear implant surgeon to participate in the basic knowledge of experienced older surgeon, and to preoperatively develop anatomic knowledge for a complete deep insertion.

In addition, we observed a longer mean of CDL in all groups than expected, which leaves discussion open for the requirement of longer electrodes in order to achieve the ideal cochlear coverage.