

1978-1998 TWENTY YEARS COCHLEAR IMPLANTS IN VIENNA

FROM EPOXY SINGLE TO CIS FAST STIMULATORS

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Vienna ENT department was one of the very first medical schools performing cochlear implant surgery. First implantation was in 1978. A postlingual deaf adult received an eight channel hybrid prototype, manufactured at the Vienna technical university. The first implantation in a child was in 1984. Since this early stages we performed more than 200 cochlear implantations, out of them 30 children between 16 and 48 months old and 30 children between 5 and 14 years old.

After different epoxy devices, 3M-Vienna, single and various multichannel cochlear implants we use at the moment, small laser sealed multi channel very fast stimulators. The most advanced technology is now realised in the MED EL Combi 40 plus cochlear implant. There are 12 pairs of electrodes on an electrode array, which can be inserted up to 30 mm into the cochlea. The electrodes are spread over 27 mm. The consistence of the siliconised platinum-iridium electrode array is very soft. In nearly all cases a complete insertion of 30 mm can be achieved. The tip diameter of the electrode is 0.4 mm at the base it is 0.65 mm. The implant body covers 33.5 x 23.4 x 3.95 mm. The coding strategy is continuous interleaved sampling in monopolar stimulation at 18.180 pulses per second. It is possible to choose the pair of electrodes for stimulation. Theoretically pair one at all 18.180 per second (which does not make sense) up to all the 12 pairs at 1.515 pulses ($12 \times 1.515 = 18.180$). As we see, for some patients, there is more benefit to use 8 pairs of activated electrodes at a pulse rate of about 2.270 per second per channel. As a result of the last two decades the monopolar very fast stimulation (at least 1.500 pulses per second per channel) over at least 6 up to 12 channels is superior to all other coding strategies.

According to enormous technical advances, improved surgical technique brought optimal benefit for implanted patients. Facial nerve monitoring, cochleostomy, soft surgery, in vivo endoscopy and individual electrode arrays lead to maximised surgical safety. Additionally we established special surgical procedures and split electrode arrays in case of total ossification or malformation. Intraoperative telemetry, stapedius tendon reflex measurements and intraoperative electric brainstem evoked response audiometry, represents direct interaction and control to the surgical procedure.

Prae and postoperative radiologic evaluation brought steps forward predicting and understanding surgical considerations. We perform high resolution CT scans, MR imaging, 3D reconstruction of the cochlea, brainstem and cochlear nerve and a

imaging of the cochlear implanted patient is nowadays possible.

For a postlingual deafened adult the mobil phone became the new statussymbol. Over the years the results came up from environment sound perception to the use of the telephone. All postlingual deafened adults (deaf up to ten years) reach open set speech understanding within two years. 70 % use the telephone. In small children (up to 4 years old) without additional handicap regular school and education will be possible.

Cochlear implantation has become a safe, efficient and costeffective high technology routine treatment which is absolutely indicated in all postlingual deafened adults and in small children.

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