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Learning Objectives:

Introduction: The concept of cochlear implantation (CI) with hearing preservation by atraumatic soft surgery is well established. The preservation of residual hearing after conventional CI is also frequently observed. The purpose of this study was to investigate predictive factor for residual hearing preservation after atraumatic CI.

Patients: Twenty-six patients (13 adults and 13 children) included in this study were received CI with atraumatic technique using standard-length flexible electrode implant through the round window approach.

Main outcome measure: Residual hearing was defined by unaided preoperative pure-tone threshold by air conduction at the mean of frequencies 125, 250 and 500 Hz. Complete hearing preservation was defined as postoperative thresholds within 10 dB of pre-implant values, hearing loss was defined greater than 10 dB of pre-implant values. Preoperative magnetic resonance imaging (MRI) was undergone in all patients, to measure cochlear fluid using software package included in the electric medical chart system.

Result: Complete hearing preservation was achieved in 17 of 26 (65%) patients. Complete hearing preservation were observed in seven of 13(54%) adults and ten of 13 (77%) children. In the patients less than the age of 6, residual hearing preservation was significantly achieved compared to other patients ($p < 0.05$). The cochlear volumes were ranged between 60 and 108 mm³ in 26 patients. The mean cochlear volume was 81.7 mm³ in the group of the complete hearing preservation, 69.0 mm³ in the group of hearing loss, respectively. Cochlear volume was significantly larger in those with the complete hearing preservation than those with the hearing loss.

Conclusion: Residual hearing preservation after conventional CI was observed in patients with younger age at implantation and larger cochlear volume in the present study. Cochlear volume could be a useful tool in predictively for residual hearing preservation after conventional CI.

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Cone beam (CBCT) imaging in cochlear implantation practice

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Learning Objectives: 1) An introduction to CBCT imaging 2) A review of the relevant literature 3) A proposal of two models of cone beam imaging in cochlear implantation practice 4) To demonstrate these models using high quality images and explanations.

Introduction: Traditional methods of imaging in cochlear implantation practice include pre-operative MRI and high-resolution CT, to examine detailed anatomical structures and to define bony detail respectively, with post-operative modified Stenver's radiography to confirm electrode placement.

CBCT offers several potential advantages, including reduced radiation dose and minimal metal artefact compared to standard CT scanning. Additionally, there is evidence that electrode position may influence auditory outcome, hence the superior anatomical detail in CBCT offers a distinct advantage over plain radiography.

Methods: A review of the literature, and a summary of the potential uses of CBCT in cochlear implantation practice, as well as our department's current practice and experience, are presented.

Results: A number of studies have assessed the potential of cone beam imaging in determining cochlear implant electrode position in human cadaveric temporal bones.

CBCT offers distinct advantage over standard CT in the form of reduced radiation, reduced metal artefact and superior bony anatomical definition. However it is not suitable for use in young children or babies due to the need to sit upright and still.

Conclusions: Two models of CBCT usage in cochlear implantation practice are explained; both are currently being trialled by cochlear implantation units in the UK:

CBCT of the temporal bone both pre- and post-operatively in cochlear implant recipients offers high quality imaging for the assessment of both bony anatomy and electrode placement. MRI scanning is still required pre-operatively in many cases. Young children cannot be reliably imaged using CBCT due to movement artefact.

An alternative use of CBCT is in the pre- and post-operative assessment of selected cochlear implantation patients, including those with complicated pathology or anatomy, in whom a detailed analysis of anatomy and electrode position is advantageous in terms of their management and prognosis.

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Computer assisted 3D planning for surgical placement of the Bonebridge bone conduction hearing implant, simultaneous implantation of epithesis anchors and audiological outcome in adults and children

Presenting Author: **Ingmar Seiwerth**

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