

Presenting Author: **Masahiro Takahashi**

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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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Free Papers (F842)

ID: 842.5

Cone beam (CBCT) imaging in cochlear implantation practice

Presenting Author: **Emma Stapleton**

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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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Free Papers (F842)

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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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Learning Objectives:

Introduction: The study aimed on evaluating the benefit of a preoperative three-dimensional (3D) planning tool for surgically placement of the bone conduction floating mass transducer (BC-FMT) of the Bonebridge (BB) bone conduction hearing implant. As the BB should be implanted in the mastoid without compromising the dura or the sigmoid sinus, placement may be challenging especially in children with small mastoids, in malformations and after multiple ear surgery.

Method: Since 2012, the Bonebridge was implanted in 22 Patients, including 7 children <16 y old (mean = 34.2 y ± 23.4 SD; min 5, max 76 y). Audiological testing was performed preoperatively, and 1 month and 3 months post-operatively. A preoperative planning tool was developed based on high resolution CT-scans of the temporal bone: AMIRA-software based 3D models of the Bonebridge implant and of the skull were freely adjusted and fused, allowing to detect the optimal implant position (“virtual surgery”). Transfer to the intraoperative situation was performed based on anatomical landmarks.

Results: The BB could be accurately placed in the selected locations. Simultaneous planning and implantation of the BB and bone anchors for ear prosthesis was performed in 2 cases. In some cases, preoperative planning revealed insufficient bone thickness of the mastoid, preventing BB-implantation. Audiological data showed a significant benefit 3 months after implantation in speech recognition, hearing in noise, in directional hearing and sound localization.

Conclusions: Audiological results were comparable to those reported in other studies about bone anchored hearing systems. Preoperative 3D planning is recommended especially in primarily small, poorly pneumatized mastoids, hypoplastic mastoids in malformations, reduced bone volume after canal wall down mastoidectomy, small mastoids in children, and for planning of simultaneous implantation of bone anchors for ear prostheses.

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Cholesteatoma and the mastoid (N843)

ID: 843.1

Secondary obliteration of discharging mastoid cavities

Presenting Author: **Lars Vendelbo Johansen**

Lars Vendelbo Johansen
Aarhus University Hospital

Learning Objectives: I will demonstrate how I now manage old discharging radical cavities. Over the years I have been

using several techniques and with varying success. Now I most frequently use BonAlive as obliteration material, some times in combination with the temporal periosteal flap (described by M Yung and P Smith). I will present videos and pictures from the operations and updated figures of my material.

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I will present videos and pictures from the operations and updated figures of my material.

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Cholesteatoma and the mastoid (N843)

ID: 843.2

Incidence of mastoidectomy among cholesteatoma patients in Denmark

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Objective:

- 1) To describe the incidence rate of first-time surgically treated middle ear cholesteatoma (STMEC1) in Denmark 1977–2015 and to estimate the proportion undergoing mastoidectomy.
- 2) To describe the recurrence rate after STMEC1 on Funen 1982–2015 taking surgical approach into consideration.

Methods: Cases of STMEC1 were identified by the use of the Danish National Hospital Register which also provided data on mastoidectomy. A change in incidence rate over time was examined using Poisson regression analysis.

For STMEC1s on Funen, the medical records were reviewed. The rate of recurrence was analyzed by the Kaplan Meier method and Cox regression analysis.

Results: A total of 16,475 STMEC1s were identified. Of these 4,416 (27%) were children (<16 years of age) and 12,059 (73%) were adults.

The incidence rate of STEM1 in adults was stable at 6–7 per 100,000 person years for the last couple of decades.

In children the incidence rate fell from 15 per 100,000 person years in 2002 to 7 per 100,000 person years in 2015.

The proportion undergoing mastoidectomy was stable (53% in children and 58% in adults).

The medical records from 1,003 patients with cholesteatoma (1,056 ears) were reviewed. The overall proportion of ears with recurrence was 38% in children and 14% in adults 5 years after primary surgery. Individuals without the need of mastoidectomy were at lowest risk of recurrence while individuals undergoing canal wall up (CWU) without