laboratory measurement of the correlation of ISQ with abutment length. Implications of the measurements for future studies and clinical measurements.

Introduction: Objective: To quantify the influence from abutment length on measured Implant Stability Quotient (ISQ) for a bone anchored hearing implant system.

Method: Design: Laboratory measurements on temporal bones. The Ponto Wide Implant (Oticon Medical AB, Askim, Sweden) was implanted in temporal bones and measurements of ISQ were made on implant level and for the 6 mm, 9 mm, 12 mm and 14 mm abutments using The Osstell ISQ and SmartPegs (Osstell, Göteborg, Sweden) type 09 (implant level) and type 55 (abutment level). By varying the insertion torque and implantation site, a broad span of implant level ISQ measurements was obtained and compared with the measurements on abutment level. The validity of the data was secured by measuring implant level ISQ before and after measurements on abutment level.

Results: For each abutment length a linear relationship existed between the implant level and the abutment level ISQ throughout the span of ISQs. The slopes for the linear correlations were similar for the different abutments lengths. The relationship for the ISQ as a function of abutment length throughout the span of implant level ISQs was also linear and the slope was measured to be -3.1 ISQ/mm ± 0.2 ISQ/mm (standard error of estimate).

Conclusion: The measured correlation between ISQ on implant and abutment level for a bone anchored hearing implant system revealed that the difference in ISQ for different abutment lengths is an additive constant independent of implant level ISQ. This relationship can be used for pooling mean results in clinical studies where different abutment lengths are used.

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ID: IP068

Evaluation of a New Powerful Sound Processor for Bone-Anchored Hearing

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Learning Objectives:

Introduction: Patients with profound hearing loss for instance as a result of cholesteatoma surgery, may experience problems with air-conduction hearing aids due to tightly fitted ear moulds and/or maximum gain restrictions by acoustic feedback. In profound mixed hearing loss that consists of a moderate sensorineural loss with a large air-bone gap a powerful direct-drive bone-conduction device (BCD) is a viable alternative for a conventional hearing aid, owing to the relatively favourable bone-conduction thresholds.

Until recently, the body-worn Baha Cordelle II processor was the only alternative for patients with a profound mixed hearing loss that needed a BCD. Recently, the head-worn Cochlear Baha 5 SuperPower Sound Processor (SP5) was introduced, which offers more advanced signal processing and wireless capabilities that may further improve the hearing experience for this patient population. In this study we will compare the performance of both devices.

Objective: We will evaluate the performance of the Baha SP5 relative to the Baha Cordelle II. The objective evaluation comprises aided thresholds, speech perception in quiet and in noise, and loudness growth measures. For the subjective evaluation questionnaires will be used.

Methods: Performance of the Baha SP5 and Baha Cordelle II will be evaluated in a group of 10 experienced Baha Cordelle users. Measures comprise free-field aided thresholds and speech perception in quiet with standard Dutch CVC monosyllables and speech perception in noise with the digits-in-noise test. Additionally, loudness growth will be measured for both devices. The performance of either device in real life will be evaluated with APHAB, SSQ, and proprietary questionnaires. The efficacy of wireless sound transmission with Baha SP5 when using the telephone or watching TV will be evaluated with a proprietary questionnaire.

Results: of this study will become available early Spring 2016. Results will be presented at the conference.

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ID: IP069

Systematic review: the radiological and histological evidence of cochlear trauma following implant insertion

Presenting Author: **Emma Hoskison**

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Learning Objectives: A systematic review to assess the radiological and histological evidence of cochlear trauma following cochlear implant insertion.

Introduction: Cochlear implantation (CI) has developed from its origins in the 1980s. Initially, CI was for profound bilateral hearing impairment. However, as candidacy for CI has become more relaxed, there is an increasing emphasis on hearing preservation.

Evidence supports the position that full electrode insertion in an atraumatic fashion into the scala tympani (ST) provides optimal hearing outcomes (Ashendorff et al 2005, Shepherd 1993, Finley et al 2008).

The main aim of this systematic review was to elucidate the degree of trauma associated with CI.

Methods: A systematic literature search was undertaken using PubMed Medline. A grading system described by Eshraghi (2003) was used to classify cochlear trauma. Both radiological and histological studies were included.

Results: Twenty one papers were identified which were relevant to our search. In total, 686 implants were inserted and 121 (17.6%) showed evidence of trauma. The cochleas with trauma had basilar membrane elevation in 10.5%, ruptured in 12.9%, the electrode passed from the ST to the scala vestibuli (SV) in 71.8% and there was grade 4 trauma consisting of spiral lamina or modiolus fracture and tear of the SV, in 4.8%.

The studies used a variety of histological and radiological methods to assess for evidence of trauma. A majority (57%) used histology either alone or with radiology (CT or x-ray). A majority of studies used cadaveric temporal bones (67%).

Conclusions: Minimising cochlear trauma during implant insertion is important to preserve residual hearing and optimise audiological performance. An overall 17.6% trauma rate suggests that CI could be improved with more accurate and consistent electrode insertion such as robotic guidance. The correlation of cochlear trauma with post-operative hearing has yet to be determined.

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ID: IP070

Is a retraction pocket an epithelial migration, intended to contact and cure an underlying inflammation, as a self-healing mechanism?

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Learning objectives: Complete drill out of all granulations and prevention of adhesions with silicone sheating of mucosa can reduce the risk of cholesteatoma recurrence.

Introduction: Theories on retraction pocket pathogenesis lack convincing proof. A new concept interprets the mysterious ingrowth of skin as a basic principle of healing as seen in other regions of the body.

Methods: Retrospective analysis of the interrelation of retraction pockets and underlying granulation tissue in 253 cholesteatoma revision surgeries in the last decade. Literature research on pathogenesis of cholesteatoma.

Results: Self-cleaning retraction pockets over non-inflamed mucosa remained stable. A retraction did not develop over well-aerated areas with unimpeded mucosal drainage. A new retraction was always contacted active granulation, which had either persisted or emanated from a former cholesteatoma surgery. Findings from experimental and clinical data in literature are in agreement with this new concept.

Conclusions: The pathogenesis of a retraction is interpreted as a natural attempt of the body to cure an underlying inflammation in a cavity. Analogue phenomena exist e.g. in the migration of the omentum towards a local inflammation in the abdomen. Based on this pathomechanism, the prophylaxis against a recurrent cholesteatoma therefore should combine a meticulous cleaning of all pneumatic cells from infectious granulation and establish a free drainage of all cavities of the middle ear into the tubal orifice, avoiding a blockage on the path of mucosal clearance. Rhinosurgery also insists on an unblocked drainage of the operated sinus. In cholesteatoma surgery, thin silicone foils should cover all non-mucosa-coated surfaces behind the tympanic membrane and also in the epitympanon and, if necessary, reaching back to the antrum, ending on the mucosa of the tubal entrance. Gas production of the healthy middle ear mucosa can recover, and the risk of a recurrent retraction is reduced.

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ID: IP071

A New Simple Radiological Scoring System for Classifying the Tegmen of the Mastoid

Presenting Author: **Sherif Idris**

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Learning Objectives:

- Variations in normal tegmen and inner ear anatomy.
- Surgical considerations when operating near the tegmen.

Introduction: The tegmen is a thin plate of bone that separates the mastoid and middle ear cavity from the intracranial compartment. The tegmen has a very variable shape, and complications may arise when operating near the tegmen. Notably, the dura may be exposed, and if this is gone unnoticed, serious intracranial complications may result, including cerebrospinal fluid leakage and neural tissue damage. One important risk factors for dural complications is low placement of the tegmen. The purpose of this study was to determine the radiographic location of the tegmen tympani in relation to the lateral semicircular canal in adult patients with normal temporal bones.

Methods: Patients who underwent high resolution temporal bone CT scanning as part of their workup for hearing loss were examined retrospectively. We included adult patients that had normal temporal bone anatomy and no previous ear surgery. The distance between the lateral semicircular canal and the lowest point of the tegmen tympani was measured in both the sagittal and coronal planes.

Results: A total of 100 temporal bones were assessed. The mean tegmen height was 4.1 mm in the cornal plane and 2.5 mm in the sagittal plane. The measured tegmen heights demonstrated a unimodal distribution with some variance.

Conclusions: Our results demonstratethat there is generally one average tegmen height, with a range of variation around this point. Based on this finding, we propose a limited tegmen height classification scheme. Tegmens below 4.5 mm on coronal measurement and 2.5 mm on sagittal measurement are considered “low” (type A) whereas tegmens above these parameters are considered “high” (type B). This classification system might have implications in prognosticating patients undergoing middle ear surgery using preoperative temporal bone CT.