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Middle ear implants in chronic ears (R774)**ID: 774.3****Coupling strategies of active middle ear implants**Presenting Author: **Stefan Dazert**Stefan Dazert¹, Jan Peter Thomas², Stefan Volkenstein²¹Ruhr-University of Bochum, St. Elisabeth-Hospital, ²Ruhr-university of Bochum, Department of Otorhinolaryngology, Head & Neck Surgery*Learning Objectives:* Active middle ear implants.

The indication range for implantable hearing devices such as active middle ear implants (AMEI) dramatically changed over the last years. While AMEI were primarily implanted to rehabilitate sensory neural hearing loss, new coupling strategies opened the way to also treat conductive and mixed hearing loss. Today, AMEI are also indicated in cases such as chronic otitis media and/or ear malformations etc.

Using current coupling systems, AMEIs may be adapted to ears with an intact ossicular chain and in cases with partially or complete missing ossicles. According to the remaining middle ear structures, the mechanical transducers of AMEIs may be adapted to different ossicles (incus, stapes) or to structures such as the oval or the round window. We will discuss advantages and disadvantages of different implants such as systems with one or two point fixation. Also, the various surgical techniques to place and adapt the transducers to middle ear structures will be addressed. Finally, we will present the post-operative outcome and want to discuss our experiences with the audience who might have had patients with similar conditions or different pitfalls.

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Middle ear implants in chronic ears (R774)**ID: 774.4****Management of mastoid cavities with Vibrant Soundbridge**Presenting Author: **Javier Gavilan**Javier Gavilan, Luis Lassaletta
*La Paz University Hospital**Learning Objectives:* To document the usefulness of VSB placed in the round window in adults with open cavities.

Introduction: The Vibrant Soundbridge (VSB) middle ear implant is a treatment option for patients with a variety of middle ear conditions such as open cavities. The VORP 503 and new couplers have been introduced to expand the possibilities of treatment.

Methods: 12 patients with mixed hearing loss, all with previous middle ear surgery underwent RW vibroplasty.

Intraoperative electrocochleography was completed during surgery to ensure the FMT coupling to the RW. Subjective benefit was evaluated using the Nijmegen Cochlear Implant Questionnaire (NCIQ), Glasgow Benefit Inventory (GBI) and Hearing Implant Sound Quality Index (HISQUI₂₉) tests.

Results: RW vibroplasty: mean follow-up was 42mo. Mean functional gain was 34 dB and speech discrimination score at 65 dB (SDS) improved from 14 to 83%. All NCIQ domains improved following surgery. All patients had a positive overall GBI score. The mean quality of sound was defined as "very good".

Conclusion: The VSB represents a safe and reliable solution of hearing restoration in adults with open cavities suffering from mixed/conductive deafness.

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Middle ear implants in chronic ears (R774)**ID: 774.5****How to avoid complications in middle ear implantable hearing aids**Presenting Author: **Levent Olgun**
Levent Olgun*Izmirbozyaka Teaching Hospital*

Learning Objectives: Implantable hearing aids recently began to widely use for conductive or mixed hearing losses. Abnormalities or altered anatomy due to chronic otitis media may be a risk factor for complications. In this presentation important points in avoiding complications would be stressed.

Introduction: Implantable hearing aids have been developed to use in sensorineural hearing loss cases. However usage of this active middle ear implants in conductive and/or mixed hearing loss recently popularised. Majority of these cases are either chronic otitis media cases who do not get satisfactory hearing after tympanomastoidectomy or congenital outer and/or middle ear abnormality cases. Altered anatomy due to previous surgeries or abnormalities may be a risk factor for complications in middle ear implant surgeries.

Method: Twenty nine cases implanted with an electromagnetic implant (Vibrant MED-EL or Otologics Carina) at Izmir Bozyaka Teaching and Research Hospital were retrospectively evaluated. Complications, adverse events and revision or reimplantation surgeries were noted.

Results: Four out of 29 cases required a revision surgery. Two cases gradually lost the hearing and we had to use a cochlear implant 2 and 6 years after first surgery. Possible factors leading to complications were evaluated.

Conclusions: Usage of middle ear implants for chronic otitis media or outer and/or middle ear abnormalities necessitates some modifications in surgical technique.

Learning Objectives: Middle ear implants can be successfully used for rehabilitation conductive/or mixed hearing

losses. However surgery should be individually tailored in majority of the cases.

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Middle ear implants in chronic ears (R774)

ID: 774.6

Middle ear implants in chronic ears (R774)

Presenting Author: **Joachim Mueller**

Joachim Mueller¹, Stefan DAZert², Robert Mlynski³, Javier Gavilan⁴, Katsumi Doi⁵, Levent Olgun⁶

¹Section Otolaryngology and Cochlear Implants, ²Ruhr Universität Bochum, ³Klinik und Poliklinik für Hals-, Nasen-, Ohrenheilkunde, Kopf- und Halschirurgie „Otto Körner“

⁴Universitätsmedizin Rostock, ⁵Hospital Universitario La Paz Madrid, ⁶Department of Otolaryngology and Sensory Organ Surgery Osaka University Graduate School of Medicine,

⁶ENT Clinic of Izmir Bozyaka Teaching & Research Hospital

Learning Objectives: To learn how active middle ear implants can contribute to hearing restoration in reconstructive middle ear surgery, especially in chronic ears and mastoid cavities. The RT discusses the coupling strategies to deliver vibrations to the cochlea, compares different coupling methods and reports on the experience in different countries. Also experience with Revision Surgeries, and strategies how to avoid complications are discussed.

During the round table the panelists comment and discuss in a structured way with the audience, how active middle ear implants can contribute to hearing restoration in reconstructive middle ear surgery, especially in chronic ears and mastoid cavities. The RT discusses the coupling strategies to deliver vibrations to the cochlea, compares different coupling methods and reports on the experience in different countries. Also experience with Revision Surgeries, and strategies how to avoid complications are discussed.

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Basic research on the otological fields (N775)

ID: 775.1

Regulation of osteoclasts is required to maintain morphology and function of ossicles in middle ear

Presenting Author: **Sho Kanzaki**

Sho Kanzaki¹, Kaoru Ogawa², Koichi Matsuo³

¹School of Medicine, Keio University, ²Scholl of Medicine, Keio University, ³Laboratory of Cell and Tissue Biology, Scholl of Medicine, Keio University

Little is known about how bone-resorbing osteoclasts play a role in the vibration of auditory ossicles. Osteoclasts are specialized multinuclear macrophages that resorb bone. Once bones develop through endochondral and intramembranous ossification (bone modeling), osteoclastic bone resorption in adults is usually followed and balanced by osteoblastic bone formation through “coupling” mechanisms, which maintain bone integrity (bone remodeling). Turnover of temporal bones including the otic capsule and ossicles is much slower than that of the long bones because the former contain high levels of osteoprotegerin (Opg), which inhibits osteoclast formation. We analyzed hearing function and morphology of ossicles in both osteoporotic and osteopetrotic mice. Ossicles in Opg deficient (*Opg*^{-/-}) mice are massively resorbed by abundant osteoclasts, resulting in impaired hearing function. In *Opg*^{-/-} mice, the ligament at the junction of the stapes and the otic capsule is lost by bony ankylosis. In addition, administration of the anti-resorptive drug bisphosphonate prevents not only erosion of auditory ossicles but also progression of hearing loss, suggesting that excessive bone resorption underlies impaired hearing in *Opg*^{-/-} mice. Conversely, osteopetrotic mice, which lack osteoclasts due to either c-Fos or RANKL deficiency, show a smaller volume of the tympanic cavity but larger ossicles compared to controls. The malleal process brevis thus touches the medial wall of the tympanic in osteopetrotic mice. These data demonstrate that regulation of osteoclastic bone resorption is required to maintain morphology of ossicles and normal hearing function.

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Basic research on the otological fields (N775)

ID: 775.2

N775 (Basic Research on the Otological Fields), Middle Ear Mucosal Regeneration by Nasal Mucosal Epithelial Cell Sheets Transplantation

Presenting Author: **Hiromi Kojima**

Hiromi Kojima, kazuhisa Yamamoto
Jikei University

Learning Objectives: Postoperative regeneration of the middle ear mucosa and pneumatization of the middle ear cavity are of great importance after middle ear surgery. This study developed a new method to transplant autologous nasal mucosal epithelial cell-sheets into the damaged middle ear cavity. The aim of this study was to evaluate postoperative healing after the transplantation of the cell sheets in rabbits. Rabbit nasal mucosal epithelial cell-sheets were fabricated from a temperature-responsive culture dish and transplanted into the damaged middle ear of rabbit, which was surgically created. The healing of middle ears was evaluated with histological methods and computed tomography findings at 8 weeks after transplantation. Functional evaluation was performed by measuring the maximum middle ear total pressure reflecting a trans-mucosal gas exchange function. Two control groups were used: the normal control group and the mucosa-eliminated control group. Transplantation of nasal mucosal epithelial cell-sheets