

*Learning Objectives:*

**Introduction:** Visualization of endolymphatic hydrops (EH) has recently become possible using MRI with contrast agents. EH could be found in cases of candidates for middle ear surgery, such as otosclerosis or ossicular anomaly. Preoperative EH could be a risk factor for inner ear disturbances following surgery. We investigated the presence of EH on MRI in ears with clinical otosclerosis or ossicular anomaly, and evaluate the efficacy of such MRI evaluation for the management of middle ear surgery.

**Subjects and methods:** Subjects diagnosed as having otosclerosis and agreed to MRI examination were randomly recruited in the study. Ears were evaluated by MRI performed 4 h after intravenous injection of gadolinium. The degree of EH in the vestibule and cochlea was classified into three grades (none, mild, and significant). Imaging data were compared with clinical findings. In ears operated, imaging data concerning the degree of EH were compared with postoperative clinical findings.

**Results:** Varying degrees of cochlear EH and vestibular EH were observed. Episodes of acute sensorineural hearing loss with rotatory vertigo occurred in some ears that showed severe EH in the cochleae and vestibules. Severe EH, however, was also observed in ears without such symptoms. The postoperative course in all ears with no EH in the vestibule was uneventful, with successful improvement of hearing levels, but a case with severe EH in the vestibule had postoperative nystagmus and long period of dizziness.

**Conclusions:** The presence of EH in ears with otosclerosis was clearly visualized in the present patient series. Moreover, the presence of EH in the vestibule on MRI might be a high risk factor in ears that are candidates for stapes surgery. Such MRI evaluation could provide useful information for managing symptoms related to EH.

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**Free Papers (F832)****ID: 832.5****A New Postoperative Adjustable Middle Ear Prosthesis**Presenting Author: **Ismail Kuru**Ismail Kuru<sup>1</sup>, Hannes Maier<sup>2</sup>, Thomas Lenarz<sup>2</sup>, Tim C. Lueth<sup>1</sup><sup>1</sup>Technische Universität München, <sup>2</sup>Hannover Medical School

**Learning Objectives:** • A new concept of a self-adapting middle ear implant for ossicular chain reconstruction in Tympanoplasty • The prosthesis has a spring-damper-element, that conducts the sound and adapts the length of the prosthesis • The spring-damper-element is made of implantable silicone material.

**Introduction:** The Tympanoplastic-III is a common method to treat conductive hearing loss by reconstructing the ossicular chain with a passive prosthesis. However, the state-of-art prostheses can only be adjusted intraoperatively and cannot adapt to the postoperative changes. Hence, suboptimal tensions on the tissues and hearing may result. Furthermore, these changes may cause prosthesis luxation, if the prosthesis is too short, or extrusion, if it is too long. Both complications require revision surgery.

**Methods:** We propose a new postoperative adjustable prosthesis for ossicular chain reconstruction with a spring-damper-element (SDE). The SDE conducts the sound waves from the prosthesis head to the prosthesis foot, while it can adapt the distance between them. The SDE consists of a closed elastic cover (spring) and a fluid fill (damper), both made of implantable silicone material. Under dynamic loads (e.g. sound waves) the damper stiffens and conducts. Under static loads (e.g. ambient pressure variations), the damper yields to a constant force when the spring contracts or extends the prosthesis.

**Results:** We have built a prototype as total ossicular replacement prosthesis (TORP). We have tested our prototype in our custom middle ear model. The prototype was built too long for the model, so that we could simulate a suboptimal reconstruction. Our preliminary measurements on the stapes footplate response to sound showed that the sound conduction of our prototype was approx. 4.5 dB higher compared to a commercial TORP of the same length. In a second experiment, we could show that the prototype could reduce the tension on the stapes footplate under varying ambient pressure compared to the commercial TORP.

**Conclusion:** Our results show, that an implantable SDE can be manufactured and it is a promising way to limit the preload, to prevent extrusion, stabilize the prosthesis against luxation and maximize sound conduction, so that the complications can be reduced to a minimum.

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**Free Papers (F832)****ID: 832.6****Tissue engineered mastoid air cells' regeneration for intractable otitis media**Presenting Author: **Shin-ichi Kanemaru**Shin-ichi Kanemaru<sup>1</sup>, Rie Kanai<sup>1</sup><sup>1</sup>Medical research institute, Kitano Hospital**Learning Objectives:** How to regenerate middle ear gas exchange function.

**Aim:** Most chronic otitis media(OMC) are observed poor development of mastoid air cells(MACs) and poor function of Eustachian tube. In order to a complete recovery from intractable otitis media, regeneration of the MACs' gas exchange functions is thought to be need. In this study, we implanted autologous bone fragments as a scaffold and gelatin sponge soaked in basic-fibroblast growth factor (b-

FGF) as a regulatory factor to the newly opened mastoid cavity and assessed whether these promote regeneration of MACs or not.

**Material and Method:** In this study, 10 cases with severe chronic otitis media (n = 3), cholesteatoma (n = 5), and adhesive otitis media (n = 2) were selected. At the 1<sup>st</sup> stage of operation, before mastoidectomy, cortex bone lid was harvested. Harvested autologous bone fragments with gelatin sponge soaked in b-FGF were implanted into the newly opened mastoid cavity and they were fixed by fibrin glue. Cortex bone lid was returned to the original position and was fixed by autologous bone pate.

By the images of high resolution computed tomography (HRCT), whether MACs were regenerated or not were estimated. The Eustachian tube function were measured before and 9 to 12 months after the 1st stage operation.

**Results:** Regeneration of MACs was observed 7 out of 10 cases (70%). In 6 out of 7 cases (86%) in the successful cases of regeneration of MACs in both group, Eustachian tube functions were improved. On the other hand, in the failure cases of regeneration of MACs, Eustachian tube functions were not improved.

**Conclusions:** Implanted autologous bone fragments and gelatin sponge soaked in b-FGF to the newly opened mastoid cavity contribute to regeneration of MACs in both HRCT images and gas exchange function.

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### Free Papers (F833)

**ID: 833.1**

#### Transcochlear approach for temporal bone cholesteatoma with facial weakness

Presenting Author: **Zhaoyan Wang**

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*Learning Objectives:*

**Objective:** To evaluate the application of transcochlear approach for temporal bone cholesteatoma with facial weakness.

**Methods:** We reviewed our institutional experience in the management of patients with temporal bone cholesteatoma. The surgical approaches and techniques were discussed.

**Results:** 6 temporal bone cholesteatoma patients with facial weakness were reviewed. Transcochlear approach was used for these patients. Immediately post-operative facial function was as the same level as pre-operatively. During follow-up, facial function was recovered in 4 cases and no recurrence was detected by annually MRI scan.

**Conclusion:** adequate explosion is important for total removal of the temporal bone cholesteatoma. recurrence can be avoid with eliminate all the debris and matrix of cholesteatoma. in

case with facial nerve involved, transcochlear approach with facial nerve rerouting can got enough vision of lesion.

**Key words:** temporal bone cholesteatoma, treatment strategy, transcochlear approach

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### Free Papers (F833)

**ID: 833.2**

#### Diagnosis and surgical management of 23 cases of petrous bone cholesteatoma

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*Learning Objectives:*

**Objective:** To report the experience on the diagnosis and treatment of petrous bone cholesteatoma (PBC) in our clinic.

**Methods:** The medical records of 23 patients with PBC who underwent surgery between 2013 and 2015 in our department were retrospectively analyzed with respect to the classification, surgical approach, facial nerve function and its management, auditory function, and recurrence.

**Results:** The median age of these patients was 32 years old. Otorrhea, hearing loss and facial nerve palsy were the most common symptoms. All of these patients presented with hearing loss and 16 patients with facial nerve palsy. 18 cases were supralabyrinthine, 1 was infralabyrinthine-apical, 2 were massive and 2 were apical. Three patients had undergone previous mastoid surgery. The surgical approaches varied according to the classification, and transcochlear approach was chosen for 15 cases (one patient operated with the endoscope assistance), transmastoid approach was chosen for 7 cases, combination of middle cranial fossa and translabyrinth approach was chosen for 1 case. The median follow-up was 14 months. Postoperatively, 17 patients were total deafness. Recurrence of cholesteatoma was found in 2 cases, and revision surgery was performed.

**Conclusion:** The surgical approach should be decided according to the classification, extent of the lesion, hearing level, and facial nerve function. Complete removal of cholesteatoma should be prioritized over the preservation of residual hearing level and facial nerve function.

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### Free Papers (F833)

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#### Where is it safe to leave residual Vestibular Schwannoma during surgery?