patients (1) within one-year follow-up (adjusted HR = 5.65, 95% CI = 3.07–10.41) or (2) under steroid therapy during hospitalization (adjusted HR = 5.14, 95% CI = 2.08–12.75).

Conclusions: Patients with stroke had a higher risk of subsequent SSNHL compared to patients without stroke. In particular, stroke patients within one-year follow-up and those undergoing steroid therapy during hospitalization should be treated with the utmost caution, considering that the risk of SSNHL increases by more than 5-fold.

doi:10.1017/S002221511600400X

What is new in Otology (R814)

ID: 814.1

What is New in Otology (R814): Intranasal surfactant treatment for Eustachian tube dysfunction and Otitis Media

Presenting Author: **Sujana Chandrasekhar**

Sujana Chandrasekhar

New York Otology; Hofstra-Northwell School of Medicine

Learning Objectives: 1. Know the role of surfactants in normal Eustachian tube function 2. Know that there is reduction of surfactant in the nasopharyngeal ET in cases of OM 3. Learn the potential for using intranasal surfactant for the treatment of ETD and OM.

It has long been understood that endogenous surfactants play a significant role in the normal functionality of the Eustachian tube (ET) and that there is a reduction in surfactants at the nasopharynx (NP) and the nasopharyngeal end of the Eustachian tube in humans with secretory otitis media. The site of ET obstruction in chronic middle ear disease appears to be at the protympanic portion of the ET more so than at the NP cartilaginous portion, which is the portion affected by balloon Eustachian tuboplasty. Previous researches have used nebulized pulmonary surfactants and shown a trend or actual improvements in ET passive opening pressure in animal models. However, due to the physicochemical properties of surfactants, nebulizing them dramatically reduces their ability to 'de-stick' apposed mucosal surfaces. Additionally, animal-derived medical surfactants are expensive and pose potential risks. We have developed a fully synthetic surfactant delivered intranasally as an aerosol via a metered dose inhaler. In normal ears, our surfactant dramatically reduced passive opening pressure of the ET in mouse and gerbil models. In gerbils with otitis media with effusion, once-daily surfactant spray reduced days of effusion from 16 to 10; twice-daily surfactant spray and once-daily surfactant with steroid spray reduced it to 8 days; and twice-daily surfactant with steroid spray reduced it further to 6 days. There was no recurrence of effusion after stopping treatment. In chinchillas with acute bacterial otitis media, intranasal surfactant spray significantly reduced effusion, severity of disease and bacterial burden without concomitant administration of antibiotics. We postulate that our synthetic, dry powder, aerosolized surfactant spray when delivered intranasally in humans will ameliorate many cases of Eustachian tube dilatory dysfunction and a range of cases of otitis media. Clinical studies to evaluate surfactant effects in humans with middle ear disease are planned.

doi:10.1017/S0022215116004011

What is new in Otology (R814)

ID: 814.2

Regeneration therapy for closing chronic tympanic membrane perforation using basic fibroblast growth factor combined with an atelocollagen

Presenting Author: **Nobuhiro Hakuba**

Nobuhiro Hakuba

Teikyo University School of Medicine, University Hospital Mizonoguchi

Learning Objectives: Various attempts have recently been made to achieve perforated tympanic membrane closure using minimally invasive ambulatory surgical procedures. Since 2000, we have introduced a treatment procedure to promote regeneration of the tympanic membrane and closure of perforations using a synthetic graft material instead of autografts such as temporal fascia. In that procedure, a perforated tympanic membrane is filled with a synthetic graft material (atelocollagen sponge/silicon membrane; TERUDERMIS®), to which human fibroblast growth factor is applied to promote wound healing (bFGF preparation; Fibrast Spray®). This study describes the details of this treatment procedure and discusses the outcome of patients who presented to our outpatient clinic and underwent the procedure for tympanic membrane regeneration over a 2-year period between July 2009 and December 2011 and who were followed for at least 1 year with respect to the preoperative factors that affect closure outcome. Complete closure was achieved in 105 (66.5%) patients after 1 year of postoperative follow up. The incidence of residual perforation was significantly higher in patients with the following four factors than in those without: 1) unidentified perforation margin, 2) severe calcification of the tympanic membrane, 3) marginal perforation, and 4) large perforation. Logistic regression analysis adjusted for the effects of each factor identified marginal perforation as significant factors affecting the outcome of tympanic membrane closure. Tympanic membrane regeneration therapy can be applied to all patients. However, in patients whose perforation margin cannot be identified, in those with severe calcification of the tympanic membrane, and in those with marginal or large perforation, the therapy should be performed prudently after obtaining consent following sufficient explanation that tympanic membrane regeneration may not be achieved.

Various attempts have recently been made to achieve perforated tympanic membrane closure using minimally invasive ambulatory surgical procedures. Since 2000, we have introduced a treatment procedure to promote regeneration of the tympanic membrane and closure of perforations using a synthetic graft material instead of

https://doi.org/10.1017/S0022215116004011 Published online by Cambridge University Press

autografts such as temporal fascia. In that procedure, a perforated tympanic membrane is filled with a synthetic graft material (atelocollagen sponge/silicon membrane; TERUDERMIS®), to which human fibroblast growth factor is applied to promote wound healing (bFGF preparation; Fibrast Spray®). This study describes the details of this treatment procedure and discusses the outcome of patients who presented to our outpatient clinic and underwent the procedure for tympanic membrane regeneration over a 2-year period between July 2009 and December 2011 and who were followed for at least 1 year with respect to the preoperative factors that affect closure outcome. Complete closure was achieved in 105 (66.5%) patients after 1 year of postoperative follow up. The incidence of residual perforation was significantly higher in patients with the following four factors than in those without: 1) unidentified perforation margin, 2) severe calcification of the tympanic membrane, 3) marginal perforation, and 4) large perforation. Logistic regression analysis adjusted for the effects of each factor identified marginal perforation as significant factors affecting the outcome of tympanic membrane closure.

Tympanic membrane regeneration therapy can be applied to all patients. However, in patients whose perforation margin cannot be identified, in those with severe calcification of the tympanic membrane, and in those with marginal or large perforation, the therapy should be performed prudently after obtaining consent following sufficient explanation that tympanic membrane regeneration may not be achieved.

doi:10.1017/S0022215116004023

What is new in Otology (R814)

ID: 814.3

Turner syndrome: Translational reserach concerning ear and hearing

Presenting Author: **Malou Hultcrantz**
Malou Hultcrantz
CLINTEC, Karolinska Institutet

Learning Objectives: Translational research concerning a syndrome with new information added stepwise.

Background: In Turner syndrome (loss of one X-chromosome) a female fenotype is presented with ear and hearing problems. These women lack ovaries and do not produce any estrogen. Both the outer, the middle and the inner ear are commonly affected in this syndrome. These women have massive otitis media problems, middle ear problems and a rapid hearing decline already at the age of 35. Males in general have a slow decline over time (from age 20), while females in general have a god hearing until time for menopause, when estrogen levels are low. What impact does estrogen have on hearing?

A Turner mouse, lacking one x-chromosome, has been developed and underlying immunological causes to explain the frequent otits media problems have been ruled out. Estrogen receptors, a prerequisite for estrogen acting in the inner ear, have been demonstrated in mice, rats, pigs and humans in the hearing nuclei where the hearing pathways are switched. There are two estrogen receptors present, an alfa and a beta receptor in the inner ear and if the beta receptor is knocked-out, mice gets deaf early at the age of 1 year.

A rapid decline in hearing is seen just at the time for menopause in the general population of women and hearing decline can improve if estrogen substitution is given. Estrogen substitution given to rats after ovaries having been surgically removed, hear better.

Methods: Experimental animal studies using immunhistochemistry, ABR measurements, genetic manipulations and hormone substitution have been performed as well as human longitudinal studies following hearing over time.

Results and Conclusion: It has been proven in animal and human studies that estrogen has an impact on hearing and can be regulated. Prednisolone does not show any receptors in the inner ear. Would it be possible to stimulate selective receptors with estrogen substitution to diminish the infections and hearing problems in the future?

doi:10.1017/S0022215116004035

What is new in Otology (R814)

ID: 814.4

What is new in Otology (R814), The new technology: canal wall up tympanoplasty with transplantation of tissue-engineered cell sheets

Presenting Author: **Hiromi Kojima**
Hiromi Kojima, Kazuhisa Yamamoto
Jikei University

Learning Objectives:

Objectives: The likelihood of recurrent retraction and adhesion of newly formed tympanic membrane is high when normal middle ear mucosa is extensively lost during intractable middle surgery. If rapid postoperative regeneration of the mucosa on the exposed bone surface can be achieved, prevention of recurrent tympanic membrane adhesion and cholesteatoma formation can be expected. The aim of this study was to develop a new method to transplant autologous cell-sheets to promote postoperative regeneration of the middle ear mucosa.

Methods: We harvested 10-by-10-mm specimens of inferior turbinate mucosal tissue from the patient with aquired middle ear cholesteaoma. Tissue-engineeed epithelial-cell sheets were fabricated ex vivo by culturing harvested cells for three weeks on temperature-responsive culture dishes in a cell-processing center (CPC) according to good manufacturing practice guidelines. After canal wall up tympanoplasty with mastoidectomy had been performed, sheets of cultured autologous cells that had been harvested with a simple reduced-temperature treatment were transplanted directly into the exposed bone surface of middle ear cavity from which normal mucosa had been defect.

Results: Autologous cell sheets were successfully transplanted to human middle ear. Postoperative tympanic membrane findings showed that there was no retraction of tympanic membrane. Furthermore postoperative CT findings showed that aeration were seen in attic and mastoid cavity

https://doi.org/10.1017/S0022215116004011 Published online by Cambridge University Press