

cholesteatoma can be potentially improved. Conventional canal wall up tympanoplasty often results in a lack of mucosal regeneration in the resected area of the mastoid cavity. We developed a novel method combining canal wall up tympanoplasty and autologous epithelial cell sheet transplantation for postoperative regeneration of the middle ear mucosa.

Methods: We obtained the approval of the ethics committee of our institution and the Ministry of Health, Labor, and Welfare. We endoscopically removed an approximately $10 \times 10\text{-mm}^2$ nasal mucosal tissue from her inferior concha. Tissue-engineered autologous nasal mucosal epithelial cell sheets were fabricated by culturing the harvested cells using temperature-responsive culture dishes for 26 days in an aseptic environment in a good manufacturing practice (GMP)-compliant cell processing center (CPC). The cultivated cell sheets were transplanted, during canal wall up tympanoplasty, onto the exposed bony surface of the attic of the tympanic and mastoid cavities where the mucosa was lost.

Results: During the cultivation, the sterile environment in the CPC was confirmed. Autologous cell sheets were successfully transplanted to human middle ear. We have already clinically applied cell sheets to treat 5 patients of middle ear cholesteatoma. All patients showed a favorable postoperative course, with no adverse events or complications.

Conclusion: This is a first-in-man study in the world that the cultured cells were transplanted to the human ear. This novel technology of transplantation might be an effective alternative to the surgical operation on intractable otitis media in the near future.

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Practicality Analysis of JOS Staging System for Cholesteatoma Secondary to a Pars tensa Perforation: Japan Multicenter Study (2009–2010)

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Learning Objectives:

Introduction: Primary cholesteatoma generally arises from retraction of the squamous epithelium of the tympanic membrane (TM). However, in rare cases, epithelial invasion occurs from the edge of the TM perforation and migrates to the medial surface of the TM. In such cases, a thick

TM, blunt perforation edge, and discharge of debris from the medial side of the TM are often observed. In this paper, the clinical features of the cholesteatoma secondary to a pars tensa perforation were evaluated and the pathogenesis of the disease was discussed.

Methods: A total of 599 ears that underwent surgery for fresh cholesteatoma between 2009 and 2010 at 6 institutions in Japan were recruited and cases with cholesteatoma secondary to a pars tensa perforation were selected. The criteria of the disease were defined as follows; a TM perforation in the pars tensa, continuous epithelial invasion from the perforation edge to the back side of the TM, and no adhesive lesion directly between the TM and promontrium. Incidence of the disease and clinical characteristics were evaluated retrospectively.

Results: Twenty-three ears of 23 patients with cholesteatoma secondary to a pars tensa perforation were identified. Incidence of the disease was 4.1 % of all of the cholesteatoma cases or 5.2 % of all of the acquired cholesteatoma cases. Characteristics of the disease were represented as following; high incidence in elder women, low rate of undeveloped mastoid air cell system, severe destruction of the stapes, and complex extension pathway.

Conclusions: The pathogenesis of cholesteatoma secondary to a pars tensa perforation is very different from that of other types of cholesteatoma. This disease should be clearly categorized as a different type of cholesteatoma and we need to recognize the nature and behavior of this disease. Additional storage of the data and detailed analysis by the multicenter study should be continued.

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Auditory test battery for the ear surgery and the postoperative evaluation

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Learning Objectives: Auditory test battery.

Hearing result of the ear surgery is important for the quality of life of the patients. Pure tone audiometry, speech audiometry, and the Eustachian tube function test are done for cholesteatoma patients and chronic otitis media ear patients in our hospital.

We studied the preoperative and postoperative hearing result of the patients from the view point of quality of life.

Case: 75 year-old female. She had the drained ear on both side from her childhood. She noticed hearing impairment when she was 74 years old. She also had discharge of the ear and visited ENT doctor. She was diagnosed that she had chronic otitis media ear on both side and ENT doctor recommended her surgical intervention.

She visited our hospital. She had large perforation on both side and the pure tone audiometry showed mixed hearing

loss on both side. Pure tone average was 38.3 dB on right ear and 63.8 dB on left ear. The speech audiometry showed 100% (60 dB) on the right and 100% (100 dB) on the left. The Eustachian tube function were normal.

Tympanoplasty was done on the right ear first and on the left ear half year after.

The pure tone average improved to 20 dB on the right ear and 30 dB on the left ear.

She used the hearing aid for the left ear before the operation, but not used it after the operation. It shows the patient does not have the handicap in dairy conversation.

Hearing improvement affect not only the dairy life activity but social life activity.

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Three cases of intracranial infection due to middle ear cholesteatoma

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Learning Objectives:

Introduction: Cholesteatoma can erode and destroy important structures within the temporal bone, thus it can cause the spreading of intracranial infections. We will describe three otogenic infectious cases by their routes of infection.

Case:

case 1: A 69-year-old man was treated for meningitis at another hospital. He was introduced to our hospital for further survey. We found meningitis caused by cholesteatoma, then we performed a tympanoplasty. Cholesteatoma eroded some parts of the temporal bone, and the otitis interna seemed to be a cause.

case 2: A 28-year-old man was introduced to our hospital because of temporal abscess. A CT revealed an area of low density in the middle ear associated with a bony defect at a part of the sigmoid sinus, and we found sinus-thrombosis around that area. Then we performed a tympanoplasty, and need to treat it with antibiotics for 2 months.

case 3: A 60-year-old man was treated for a brain abscess at another hospital. He was introduced to our hospital because cholesteatoma was pointed out. We performed a tympanoplasty and an abscess drainage, then continued to treat it with antibiotics for 4 months.

Discussion: Concerning the routes of otogenic intracranial infection, there are three routes: otitis interna, a direct invasion through the eroded temporal bone and a hematogenous infection such as phlebitis of meningeal veins. In all cases, it is important to remove the primary disease and continue treatment with the effective antibiotics. But in certain cases, performing an abscess drainage was also required. We decide the indication for surgery depending on the patients' condition and a proposal from the neuro-surgeon.

For our patients, a tympanoplasty was performed first because their conditions were stable due to the antecedent treatment.

Conclusions: It is controversial when to operate for cholesteatoma with intracranial complications. The appropriate treatment should be required in accordance with the condition.

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Differences in clinical features between cholesteatoma in external auditory meatus and middle ear

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Learning Objectives:

Objective: Differences in clinical features, especially facial nerve canal lesion between cholesteatoma in external auditory meatus and middle ear were compared.

Method: A retrospective clinical analysis was made. Clinical data included 125 cases of middle ear cholesteatoma with facial nerve canal lesion and 28 cases of cholesteatoma occurred in external auditory canal from Jan. 2003 to Aug. 2014 in our hospital.

Results: Clinical course of cholesteatoma in external auditory canal was 4.97 ± 7.51 years, course of middle ear cholesteatoma was 16.60 ± 14.42 years ($P < 0.01$). 21 cases (75%) of external auditory canal cholesteatoma were manifested as pneumatic mastoid and 110 cases (88%) of middle ear cholesteatoma were manifested as diploic mastoid respectively. 22 cases (78.6%) of facial nerve canal damage in mastoid segment in cholesteatoma of external auditory meatus and 76 cases (60.8%) of facial nerve canal damage in tympanic segment in cholesteatoma of middle ear were observed ($P < 0.01$). The incidence rate of ossicular erosion in middle ear cholesteatoma was significantly higher than that in external auditory meatus ($P < 0.01$). The incidence of semicircular canal defects in middle ear cholesteatoma (30.4%), was significantly higher when compared to the incidence (10.7%) in cholesteatoma of external auditory meatus ($P < 0.05$).

Conclusion: The sites of facial nerve canal lesion in middle ear cholesteatoma and cholesteatoma of external auditory meatus were different. More attention should be paid before and during operation to avoid facial nerve injury, including physical examinations, especially otologic exams, radiological reading and careful operation.