

Learning Objectives: Teaching the complex anatomy of the middle ear has always been a challenge. Textbook drawings and diagrams often fail to show the intricate 3D relationships of the various structures.

The Sydney Endoscopic Ear Surgery (SEES) Research Group has produced a series of videos looking specifically at the anatomy of this region, as visualized with new endoscopic techniques. The endoscope enables an incredible view of areas, such as the retrotympaanum, previously hidden by microscopic techniques.

Each video looks at a specific area of the middle ear and describes its anatomical relationships and clinical correlation. The videos will be available as a free online resource to anyone wishing to use them.

This presentation will demonstrate key parts of the video series and discuss in a broader context how the endoscope has improved trainee education of ear anatomy.

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Endoscopic Ear Surgery: Concept and Technique 2 (V867)

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Transcanal Endoscopic Ear Surgery for Lateralized Tympanic Membrane and Medial Meatal Fibrosis

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Learning Objectives: Techniques for surgical treatment of LTM and MMF with TESS.

Introduction: The lateralized tympanic membrane (LTM) and medial meatal fibrosis (MMF) are conditions in which the visible surface of the tympanic membrane (TM) is located lateral to the bony annular ring. While the TM is out of position in each condition, the causes differ for the lateralization and the final position of the TM layers. Specifically the LTM loses contact with the ossicular chains while MMF is characterized by acquired atresia with fibrous tissue in the medial part of external auditory canal. Treatment of LTM and MMF presents challenges, in part due to difficulties in visualizing the affected site. Our unit has worked on developing a treatment protocol which incorporates and extends current treatment approaches as well as incorporates the use of the endoscope to achieve a less invasive approach with improved visualization of the affected site.

Methods: Transcanal endoscopic ear surgery (TEES) was used to treat both LTM and MMF using a rigid endoscope with an outer diameter of 2.7 mm coupled to a full HD system. A cross-shaped incision is made across the TM surface and four skin flaps are elevated to exposure the pathology. LTM is treated by removing the mucosa from the ear

canal wall and grafting the TM perforation with fascia to the anterior part of tympanic annulus using the underlay technique. MMF is treated by removing the fibrous tissue from the bony ear canal and the TM lamina propria. The lamina propria and denuded bone is covered with split-skin grafts. Both conditions require canalplasty using a curved bur for complicated bony canal stenosis.

Results: Endoscopes allow for greater overall visualization which is a significant advantage in the surgical treatment of LTM and MMF particularly around the tympanic annulus.

Conclusions: Surgical treatment for LTM and MMF via TEES is an effective and less invasive procedure.

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ID: IP001

The Diagnosis and Treatment of Middle Ear Cholesteatoma with Tuberculous Otitis Media Co-infection: A Series of 11 cases

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Introduction: Tuberculosis is thought to be an endemic disease in the Philippines wherein there have been a number of documented tuberculous otitis media (TOM) cases. The suspicion of TOM co-infection among patients with cholesteatoma of the middle ear (CME) has led to this investigation.

Objectives: 1.) To describe the clinical features and the treatment outcomes of patients with CME and co-existent TOM. 2.) To compare the features of TOM with CME to that of TOM without cholesteatoma.

Study Design: Retrospective review of cases.

Setting: Tertiary private hospital.

Patients: 11 out of 73 patients were diagnosed with TOM and co-existent CME from January 2009-September 2014.

Interventions: Pure tone audiometry, CT-scan, PPD skin test, chest x-ray, PCR and histopathologic examinations were used as diagnostic procedures. The patients underwent single-stage tympanoplasty with mastoidectomy and anti-tuberculosis pharmacotherapy.

Main Outcome Measures: Otoloscopic, audiometric and clinical evaluations were done upon follow-up.

Results: The primary clinical feature among our cases was the presence of cholesteatoma and chronic otorrhea. No residuals or recurrences were noted upon follow-up of the patients. The mean air-bone gap improvement after surgery and pharmacotherapy was 10.5 dB. The detection of tuberculosis infection was detected via PCR in all of the 11 patients with TOM and CME. CT-scan findings showed that the majority of TOM with CME patients exhibited various characteristics that are not present in TOM alone. Most of the TOM with CME patients exhibited positive PPD test results while exhibiting negative chest x-ray results.

Conclusions: The clinical and radiologic features of our TOM with CME patients were notably different from the more frequently reported TOM cases without CME. Modest short-term treatment outcomes can be achieved when antituberculosis medical therapy is adequately given after cholesteatoma surgery among TOM with CME patients.

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ID: IP002

The Effects of electromagnetic field exposure at 900 MHz frequency emitted from mobile phones on cochlear cells

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Learning Objectives:

Aim: Technological developments encountered radiofrequency field from mobile phones in our lives. Possible side effects of electromagnetic field (EMF) need to be investigated. The aim of this study is to evaluate cytotoxic,

apoptotic and DNA damage effects of 900 MHz EMF emitted by mobile phones on House Ear Institute- Organ of Corti 1 (HEI-OC1 cell line) cochlear cells.

Methods: Cochlear cells were cultured in 6 well plates at 33°C, 10%CO₂ in humidified conditions. They were exposed to 900 Mhz EMF in conditions of 5 minutes and 15 minutes, directly and 10 cm away from EMF. EMF was applied by a 3 G cell phone and measured by Arduino EMF detector. Cell viability and apoptosis were evaluated after 24 and 48 hours after exposure for each condition and control group by trypan blue and Annexin V methods respectively. DNA damage related gene expressions were evaluated by real time PCR after RNA isolation and cDNA synthesis.

Results: Cell death was more prominent in cells which received 5 minutes of EMF at 48 h. The apoptosis ratio in cells situated 10 cm away from EMF were similar to cells that were directly exposed to 5 minutes of EMF. In gene expression results it was observed that DNA damage related gene expressions were increased in cells after EMF exposure in 48 hours. The expression levels are nearly same in cells that were 10 cm away from EMF. The genes that showed high expression than control are Bax, Gadd45a, Gadd45 g, Mpg, Msh2, Rad51c and Xrcc3, which are related to apoptosis induction and DNA repair.

Conclusion: EMF at high dose for 5 minutes caused cell death via apoptosis in HEI-OC1 cell line in vitro. This result was supported by apoptosis detection and DNA damage related gene expressions. Apoptosis was prominent in 5 minutes and similar for both direct and close distance exposure. Further in vivo and in vitro studies with different doses and distances are needed to evaluate the effects of EMF on cochlea.

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Friendship of Capsaicin and Cisplatin in HEI-OC1 Cells

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Learning Objectives:

Introduction: Cisplatin (CDDP) is anticancer agent with serious side effects like ototoxicity. Capsaicin, the active ingredient of chili peppers, has protective effects against CDDP induced renal toxicity. The aim of this study was to evaluate the role of capsaicin on CDDP induced apoptotic cell death and DNA-damage related genes in House Ear Organ Corti (HEI-OC1) cells.