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Hearing reconstruction: How I do it (1) (V617)

ID: 617.1

Use of Hydroxyapatite (HA) Cement for Ossicular Reconstruction

Presenting Author: **Joel Goebel**

Joel Goebel

Washington University School of Medicine

Learning Objectives: 1. Understand the indications for use of HA cement for ossicular reconstruction. 2. Appreciate the surgical tips for successful application of HA cement to the ossicular chain.

Panel Discussion: Use of Hydroxyapatite (HA) Bone Cement for Ossicular Reconstruction

Abstract: Reconstruction of the ossicular chain in chronic ear disease and cholesteatoma depends on many factors including ossicular chain remnant, state of middle ear aeration and Eustachian tube function and ability to eradicate middle ear mucosal disease. In select cases, use of hydroxyapatite (HA) bone cement to re-establish ossicular chain continuity is a viable method of reconstruction. In this panel, various methods of reconstruction will be addressed and the role of HA cement will be discussed including video demonstration of practical surgical tips for application of HA cement to the ossicular chain remnant for reconstruction.

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Hearing reconstruction: How I do it (1) (V617)

ID: 617.2

Hydroxyapatite cement for ossiculoplasty

Presenting Author: **Stefan Delrue**

Stefan Delrue, Joost van Dinther, Andrzej Zarowski, Thomas Somers, Erwin Offeciers

European Insitute for ORL - Antwerp

Learning Objectives: To overcome the impedance mismatch between the tympanic membrane and cochlear fluids, the normal ossicular chain functions as a lever system.

Several surgical techniques are available to restore its continuity in case of interruption. Biocements are one of the latest innovations and allow maintaining the normal tri-ossicular structure, which results in a more physiologic energy transfer. Hydroxyapatite is an inorganic mineral and natural component of the human bone. It can be easily prepared by mixing a powder and liquid component, which subsequently forms a paste that slowly hardens. Compared to ionomeric cement, hydroxyapatite does not provoke any inflammatory reaction when in contact with the soft tissues of the middle ear. This workshop shows the application of hydroxyapatite cement in bridging incudostapedial discontinuity as well as other ossicular interruptions in a faster and easier way. Moreover hydroxyapatite cement can be used to stabilize ossicular prostheses. Based on retrospective case series the functional results with cement are initially similar to standard ossiculoplasty techniques but better over time.

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Keratinocyte in health and disease (K623)

ID: 623.1

The keratinocyte in health and disease

Presenting Author: **Irene Leigh**

Irene Leigh

University of Dundee

Learning Objectives: To understand the processes involved differentiation of normal stratified squamous epithelia To understand the changes in keratinocte hyperproliferation, dysplasia and structural genodermatoses.

The biology of the keratinocyte has been greatly enlightened by the ability to culture keratinocytes from the epidermis and mucosal stratified squamous epithelia in the laboratory, developed in 1975 by the use of a feeder layer and added growth factors. Subsequently the processes regulating keratinocyte stratification and diffentiation have been characterised, in particular the changes in keratin expression, as a cell migrates from the stem cell compartment within the basal layer into suprabasal layers , and the formation of the cornified envelope. Normal site specific differentiation is heavily dependent on both permissive and directive signals from the underlying dermis. During hyperplasia, as seen in the skin during psoriasis and wound healing, the keratinocyte undergoes an alternative pathway of differentiation with alterations in keratin expression particularly keratins 6 and 16 and additional effects on terminal differentation. In dysplasia and malignancy, markers of keratinocyte differentiation tend to remain but additional expression of simple epithelial markers is associated with tumour invasion. Many genetically inherited skin diseases and associated syndromes, such as sensorineural deafness, are associated with point mutations in structural proteins including keratins, and junctional complexes. Patients with atopic eczema has been found the have a very rate of mutations in filaggrin: a filament aggregating protein critical for formation of a normal stratum corneum and these mutations result in significant impairment of barrier function, a hallmark of atopic eczema. Understanding keratinocyte differentiation and alterations in disease can give insights into the pathology of other stratified squamous epithelia including cholesteatoma.

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The role of persistent infection in the pathogenesis of cholesteatoma (K625)

ID: 625.1

The Role of Persistent Infection in the Pathogenesis of Cholesteatoma

Presenting Author: **Richard Chole**

Richard Chole

Washington University in St. Louis School of Medicine

Learning Objectives: To understand the significance of chronic, recalcitrant infections in cholesteatomas. Processes including biofilm formation and bacterial persistence.

Acquired and sometimes congenital cholesteatomas, often become chronically infected. The most common organisms associated with infected cholesteatomas are *Pseudomonas aeruginosa* and *Staphylococcus aureus.* Other gram negatives are common associated pathogens, such as Klebsiella, Proteus and E.coli. Infected cholesteatomas are more aggressive and destructive than uninfected cholesteatomas as evidenced by clinical observation and studies in experimental models of cholesteatoma.

The eradication of bacterial infections within cholesteatomas has proven difficult. Treatment with systemic and topical antibiotics often fails to eradicate the infection even though the involved organisms are sensitive to the antibiotics used. The mechanisms of bacterial resistance intolerance in cholesteatomas are complex. There are several possible mechanisms for the tolerance of chronic clinically bacteria in chronically infected cholesteatomas. These include: 1) sequestration of the cholesteatoma matrix from the general circulation; 2) ineffeective penetration of topically applied antimicrobials; 3) formation of microbial biofilms within the cholesteatoma with the resultant change in phenotype to be tolerant to host defenses and antibiotics; and 4) formation of persister cells in bacterial colonies. These cells while viable at a very low metabolic rate and low levels of replication. This change makes this persister cell type highly resistant to antimicrobials.

Strategies to eradicate biofilm infections and the presence of persister cells will be discussed.

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Petrous Cholesteatoma (R631)

ID: 631.1

Cholesteatoma of the Petrous Apex: Facial Nerve Management

Presenting Author: **Richard Irving**

Richard Irving

Queen Elizabeth Hospital

Learning Objectives: Both congenital and acquired cholesteatomas are found in the petrous temporal bone, with the latter being more common. Congenital cholesteatomas arising in the apex erode from the medial aspect involving the facial nerve more frequently in its IAC and labyrinthine segments. Congenital middle ear cholesteatomas tend to present earlier with a conductive hearing loss and if left untreated can erode along the facial nerve superior to the cochlea involving the geniculate ganglion and labyrinthine segments. Acquired cholesteatomas involving the apex in contrast all arise in the tympanomastoid region and extend medially. These extensive acquired cholesteatomas can involve multiple segments of the intratemporal nerve from IAC to stylomastoid foramen. In the authors experience 50% of cases of apical cholesteatoma had facial nerve involvement at presentation.

The management of apical disease remains contentious. While the aim of surgery should be complete excision of disease, this should be balanced against achieving a good neurological outcome for the patient. Complete excision is often complicated by limitations in access and the tight adherence of cholesteatoma matrix to key structures such as the facial nerve, internal carotid artery and dura. The author would typically not sacrifice a functioning facial nerve in order to improve the chance of complete excision of disease. Using this approach long-term disease control and good facial motor function can be achieved in both congenital and acquired apical cholesteatoma.

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Petrous Cholesteatoma (R631)

ID: 631.2

The role of the Transotic approach in cases of Petrous Bone Cholesteatoma

Presenting Author: **Miguel Arístegui**

Miguel Arístegui

Hospital General Universitario Gregorio Marañón Madrid Spain

Learning Objectives: We will show the benefit of the transonic approach as a safe procedure to preserve facial nerve function, to achieve total resection and to prevent complications, in cases of Petrous Bone Cholesteatoma.

Petrous Bone Cholesteatoma is a life threatening condition. Acquired or congenital in origin, is one of the most challenging intratemporal lesions.

Depply located inside the petrous portion of the temporal bone the difficulty to manage this lesions is conditioned by the involvement of structures like the otic capsule, the facial nerve, the dura, the internal auditory canal, the sigmoid sinus, the jugular bulb or the internal carotid artery.

Techniques that include subtotal petrosectomy are commonly associated to prevent future infections. Preservation of hearing is not a reasonable objective in many cases if total resection should be accomplished. The transtic approach with elimination of the anterior and posterior otic capsule leaving the facial nerve in place, adapts to some of this challenging lesions.

We report on a series of 60 Petrous Bone Cholesteatoma A Modified Sanna Classification is used to define the location and extension of the lesions.

We will report on hearing function, facial nerve function and complications.

We will focuss on those cases in which we have used the transotic approach to preserve anatomically and functionally the facial nerve.