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Advances in Understanding of Eustachian Tube Dysfunction and Cholesteatoma (N675)

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Eustachian Tube Dilatory Dysfunction: Diagnosis and Deterioration

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The middle ear and mastoid system behaves as an auxiliary sinus and the Eustachian tube (ET) can be thought of as a long, dynamic ostium with a functional valve located within the cartilaginous portion in order to optimize the ear's special sensory role of hearing. Failure of the "valve" to function properly can occur if it dilates insufficiently to adequately aerate the middle ear and it is affected by the same pathophysiological processes as the nose and other sinuses.

ET dilatory dysfunction occurs when tubal dilatory effort is consistently insufficient to adequately aerate the middle ear with the possible consequences of negative middle ear pressure, retraction of the tympanic membrane, otitis media with effusion, tympanic membrane perforation and conductive hearing loss.

There are a number of hypotheses as to how retraction of the tympanic membrane may become fixed to the middle ear mucosa and progress to a retraction pocket, begin to collect desquamated debris and ultimately deteriorate into a cholesteatoma. Upregulation of inflammatory mediators and biofilms have been demonstrated within retraction pockets and could play a role in epithelial migration. Mucosal traction has been proposed as another mechanism. It has been observed that tympanic membrane retraction correlates with the presence of inflammatory disease within the cartilaginous ET, but not with the severity of observed tubal pathology. Thus, it has been proposed that retraction may be initiated by ET dilatory dysfunction, but an independently mediated biological process of retraction ensues after reaching some "point of no return." After the retraction process has been activated, it may continue despite aeration of the middle ear, either by tympanostomy tube or resolution of the tubal dilatory dysfunction.

As an early intervention in children, lateralization of a retraction pocket with lysis of its binding adhesions can arrest the process and may be protective against development into a cholesteatoma. However, once a cholesteatoma has developed, cartilage grafting of the tympanic membrane is often needed to prevent recurrence, despite an aerated middle ear, suggesting that the biological process of retraction may remain active for some time after eradication of the obvious disease.

Most of the pathology that is responsible for dilatory dysfunction has been observed within the cartilaginous portion and is most commonly due to inflammatory disease, which can be readily diagnosed with transnasal endoscopy. Disorders of dilation may be observed and classified with a dynamic exam during swallows and yawns. Inflammatory disease can be graded on a recently validated mucosal inflammation score instrument. The etiology of the

inflammation can be investigated and treated, with the most common causes being infectious or reflux in younger children and over age 6, allergic disease, reflux, rhinosinusitis, adenoid hypertrophy and other commonly known causes of nasopharyngeal inflammation. Treatment of the underlying medical conditions can result in improvement of ET function and resolution of middle ear disease. Surgery may be indicated when the medical causes have been optimally treated, but ET dilatory dysfunction persists, possibly due to irreversibly injured mucosa, biofilms or other pathology.

This presentation will show a practical approach to evaluating ET function. The dynamic endoscopic examination of the cartilaginous portion of the ET will be discussed in detail, along with recognizing and grading inflammatory pathology. Comparisons will be made between the diffuse tympanic membrane retractions associated with ET dilatory dysfunction as opposed to the retraction pockets that are presumed to be due to biological processes. Differentiating between these two mechanisms is critically important in determining appropriate treatment. Indications for surgical intervention will be discussed.

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Controversies in Aetiology and Management of Cholesteatoma (N675): Managing Cholesteatoma: Something Old, Something New, and Something Borrowed

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Learning Objectives: 1. Correlate histopathologic evidence to predict clinical location of cholesteatoma. 2. Appreciate new real-time imaging modalities to optimize complete removal of cholesteatoma while preserving normal structures. 3. Understand the utility of MR imaging in the management of cholesteatoma.

Surgical extirpation of cholesteatoma must be adequate to negate recurrent or recidivistic disease but maintain as much hearing function as possible in a healthy mucosalized space. A thorough understanding of patterns of growth of various types of cholesteatoma enables the otologic surgeon to accomplish this. As the "something old" we have access to temporal bone histopathologic specimens that show us the usual path of an atticointral cholesteatoma vs. a tubotympanic one. Studying otopathologic slides allows for such in-depth understanding that it becomes second nature to the surgeon to anticipate the location of disease. The "something new" involves optical imaging with high resolution microendoscopes, multiwavelength fluorescent otoscopes, and multi-color reflectance imaging of middle ear pathology in vivo. Use of these methods should allow the surgeon to remove all disease while maintaining the integrity of the normal or