Otology is the only specialty in medicine that cannot routinely use the services of the Pathology Department of a hospital for pathologic diagnosis. Human temporal bone histopathology is more important than ever, but it requires the expertise of a human temporal bone processing laboratory; only a few such laboratories are in existence. Otopathologic studies in humans and animals have led to findings of pathology within the middle ear cleft that were hitherto unnoticed; in turn, such findings have resulted in innovative ways to diagnose and treat patients.

A classic example of chronic tissue pathology that can occur behind an intact tympanic membrane is congenital cholesteatoma. However, acquired cholesteatoma can also exist behind an intact tympanic membrane (Figure 1). Several studies have reported intractable tissue pathologies other than cholesteatoma that went undetected.

Chronic otitis media has been defined in textbooks as a condition associated with a perforation of the tympanic membrane with a past or present history of otorrhea. The Committee for nomenclature of otitis media has replicated this standard definition on a regular basis (1). In 1979, Paparella et al introduced the concept of ‘silent’ otitis media, to describe chronic pathological conditions that are clinically “undetected” behind an intact tympanic membrane (2). Since this chronic pathology is potentially undetected, there is usually lack of medical treatment, which increases the risk of complications and sequelae such as endolymphatic hydrops, serous labyrinthitis and sensorineural hearing loss (3).

Figure 1:
Human temporal bone slide showing a cholesteatoma behind an intact tympanic membrane. The cholesteatoma fills the posterior part of the tympanic cavity and extends to the stapedial footplate. Note that the facial nerve is dehiscent.
Meyerhoff et al studied 333 temporal bones with otitis media, the most common being chronic presence of granulation tissue. They concluded that chronic otitis media occurred frequently in the absence of tympanic membrane perforation, with only 19.5% associated with a perforation (4).

Da Costa et al studied chronic otitis media with perforated (28 temporal bones) and non-perforated tympanic membranes (116 temporal bones). Histopathologic changes of the middle ear such as granulation tissue (Figure 2), ossicular changes and cholesterol granuloma were similar in temporal bones with and without perforation (5).

Jaisinghani et al studied 150 temporal bones from 97 subjects with chronic otitis media to correlate the presence of middle ear pathologies with histopathological changes of the tympanic membrane. They indicated that almost half of the temporal bones with middle ear pathology had no associated tympanic membrane pathology (6).

Mehta examined 60 temporal bones of stillborns and neonates who died of causes other than septicemia for evidence of otitis media. He found 23.3% had silent otitis media (7).

Djeric et al studied the histopathological findings of 16 temporal bones from 8 infants with otitis media who died of meningitis. Although meningitis had a rapid course ranging from 1 to 5 days, the presence of granulation tissue and infiltration of chronic inflammatory cells in the middle ear indicated that the otitis media had been present prior to the onset of meningitis. There was also chronic inflammatory cell infiltration of the round window membrane, the cochlear aqueduct and modiolus, with accumulation of cells in the adjacent scala tympani. Since all tympanic membranes were intact and in addition, 3 were histologically normal, this silent route of infection necessitates medical attention (8).

Chronic silent otitis media with its potentially serious sequelae is undetected or undetectable by traditional otoscopy. However, multifrequency tympanometry, otoreflectance and otoacoustic emissions may allow one to detect silent chronic pathological conditions such as cholesteatoma and other middle ear pathologies behind an intact tympanic membrane (9). Plain x-rays or computed tomography are also helpful to define disease in the middle ear cleft. The history, as always, is the most important constituent for diagnosis. Although the pathology may be undetected and silent, symptoms of hearing loss, dizziness and recurrent infection may occur.
Conclusion:
Chronic silent otitis media, characterized by intractable tissue pathology behind an intact tympanic membrane, is a common finding in human temporal bone studies. There should be a heightened awareness of this condition. Chronic silent otitis media can result in potentially serious sequelae and/or complications and can occur in both children and adults.

References

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LAB SPOTLIGHT

OTOPATHOLOGY LABORATORY AT THE UNIVERSITY OF MINNESOTA
MICHAEL M. PAPARELLA, M.D. & SEBAHATTIN CUREOGLU, M.D.

The Temporal Bone Laboratory at the University of Minnesota was established in 1967 by Dr. Michael M. Paparella. The laboratory has collected, processed and studied more than 2,000 normal and pathologic human temporal bones, making this collection one of the largest of its kind in the world. The Laboratory utilizes a variety of techniques to study temporal bones including standard light microscopy, electron microscopy, histochemistry, immunostaining and in-situ hybridization. The collection also contains temporal bones from a variety of animal species including mouse, guinea pig, chinchilla, rat, dolphin, owl, sheep and dog.

Since it was established in 1967, over 250 physicians and scientists from all over the world have been trained in the Laboratory. This includes 26 Professors and department Chairs and an additional 50 full time faculty members in universities throughout the United States and the world. Research conducted in the laboratory has resulted in over 1,000 publications in peer-reviewed journals, covering the entire spectrum of hearing research.

The laboratory continues to be under the direction of Dr. Michael M. Paparella. Dr. Sebahattin Cureoglu and Dr. Vladimir Tsuprun are senior scientists. Carolyn Sutherland is the manager of the laboratory. Other senior scientists who are affiliated with the Laboratory include Dr. Steven Juhn, Dr. Peter Santi and Dr. Jizhen Lin. At any given time, the Laboratory also has several post-doctoral fellows engaged in a variety of projects. Some of the ongoing research projects include “3D reconstructions of inner ear structures in Meniere’s disease”; “Round window otosclerosis”; “Use of optical coherence microscopy in human temporal bones”; and “DNA methylation in human chronic otitis media”.

Lab personnel, from left to right: Shigetaka Shimizu (Research Fellow), Shigetoshi Toda (Research Fellow), Carolyn Sutherland, Monica Schachern, Sandra Koterski (Clinical Fellow), and Dr. Sebahattin Cureoglu
NEWS AND ANNOUNCEMENTS

The Temporal Bone Registry has a new updated website
The address is the same

www.tbregistry.org

Please visit and enjoy the updated features
PLEASE! Notify us of your change of address before you move. Each undelivered newsletter is returned to the Registry office at a cost of $.70. Our loss is over $1.00 per unit.

Thank you!

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<td>A short brochure that briefly describes the functions of the Registry, and answers commonly asked questions regarding the temporal bone donation process.</td>
<td>A 16-page, full-color booklet which describes in more detail the benefits of temporal bone research. It also answers commonly asked questions regarding the temporal bone donation process.</td>
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