

**A CASE OF SUPPURATIVE MIDDLE EAR DISEASE WITH  
INVOLVEMENT OF THE LABYRINTH LIMITED TO  
THE RIGHT COCHLEAR PORTION AND TO  
THE LEFT VESTIBULAR PORTION.**

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The increased interest shown in recent years in diseases of the labyrinth, particularly in suppurative diseases, and in the methods of examination of the non-acoustic portion of the auditory nerve, brings up a number of interesting questions in regard to the manner in which the labyrinth becomes involved in suppurative disease. The older view was that suppuration of the labyrinth consequent upon middle ear disease always resulted in total loss of function of both branches of the auditory nerve.

The more accurate modern methods of testing the functions of the vestibular portion of the ear, particularly the rotary and caloric tests, have made it possible to detect a loss of function of the vestibule and semicircular canals which formerly we had no way of determining. Some of the questions that arise in connection with labyrinthine involvement in the course of suppurative middle ear disease are these:

When the labyrinth becomes involved during the course of a middle ear suppuration, is this involvement always due to an invasion of pus, or can there occur an inflammatory exudate temporarily or permanently disturbing the function of the labyrinth without any actual pus formation?

How much destruction can be expected to follow a non-purulent exudate into the labyrinth?

Does a purulent exudate into the labyrinth necessarily destroy the function of all the end organs in the labyrinth?

The following case may throw some light upon some of these questions, since it is a case of suppuration involving both middle ears, in which examination shows a total loss of the auditory function in the right ear, with the vestibular apparatus acting normally or even excessively while the left ear retains the greater part of the cochlear function but shows a very imperfect vestibular function. The case is as follows:

Lydia M., age 40, single, American, occupation housework. This patient came to my service at the Central Free Dispensary on April

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16, 1908, with the history that her ear troubles began in May, 1906, with a watery discharge from the right ear and a purulent discharge from the left ear. During the month of May, 1906, she was troubled a good deal with subjective noises in the right ear. Within a month she became totally deaf in the right ear, as she believes. She is positive in her assertions that she was not dizzy at this time, and she cannot recall having pain. She was sent to the Illinois Charitable Eye and Ear Infirmary in July, 1906. A week later she had a cautery operation on her nose. A little later she had a cutting operation in which a piece of bone was removed. Still later she had a radical mastoid operation on the right side. On August 6th, 1907, she had a radical mastoid operation on the left side. Before this last operation she asserts that she heard well at times. There was a good deal of pain and considerable discharge from the left ear preceding the operation. There is nothing in the history pointing to a brain complication.

*Present Condition.*—The right ear still secretes a little pus from the vicinity of the tuba auditiva but is otherwise dry and lined with epidermis. There has been a formation of a thin membrane over the lower part of the tympanum, movable on inflation by Politzer's method. The left ear is dry and lined with epidermis.

*Hearing tests.*—The patient is very deaf and conversation can only be carried on by means of a speaking tube, or, as she habitually does with her mother, by laying her cheek against her mother's while the latter is talking. *Tuning fork tests.*—Bone conduction, using the big A fork in the median line, is prolonged about 30 seconds. Bone conduction is about 20 seconds longer over the left mastoid than over the right. Weber is lateralized in the left, the better hearing ear. Rinne is negative in each ear. The right ear is apparently deaf to all sounds. The left ear has for its low limit the tuning fork of 100 vibrations. Below this point her answers are so uncertain that it is evident that she does not hear the tones. From 100 vibrations to G<sup>2</sup> she hears by air conduction, then follows an area of deafness until 15 of the Edelmänn-Galton whistle is reached, when she shows an island of hearing reaching from 15 to 11 of the whistle. Above 11 she hears nothing.

*Tests of the vestibular apparatus.*—There is a little spontaneous nystagmus on looking towards the right but none on looking towards the left. Cold in the left ear caused no change. Heat in the left ear caused no change. Cold in the right ear caused marked dizziness at once, so severe that the patient found it necessary to cling to the table for support. On looking toward the right she

showed a marked nystagmus. On looking toward the left there was a slight amount of nystagmus developed. After using heat in the right ear there was a slight degree of nystagmus developed on looking toward the right, but none at all on looking toward the left.

There was no change on using Siegel's speculum in the left ear, but either compression or rarefaction of the air in the right tympanum caused dizziness. The use of Siegel's speculum had no effect on causing or inhibiting nystagmus.

Neither nystagmus nor dizziness could be elicited by the use of the probe in the right ear. She walks forwards or backwards with the eyes either open or closed, and shows no disturbance of equilibrium or gait. She draws lines with the eyes closed, simultaneously, of slightly different length, the right being about 1-10 shorter than the left. These tests would seem to indicate that the right vestibular apparatus is intact and in an easily irritable condition, i. e., that it can respond easily to caloric tests. The left vestibular apparatus, on the other hand, responds so slightly to the caloric tests that the conclusion I draw is that its function has been largely interfered with if not entirely destroyed. The slight spontaneous nystagmus is probably due to a hypersensitive or an unbalanced right vestibular apparatus.

The case then seems to be one where the right vestibular nerve is active and the left inactive while the right cochlear nerve is inactive and the left active.

The occurrence of a circumscribed defect in one ear limited to the cochlear nerve and in the opposite ear limited to the vestibular nerve is worthy of note, particularly since it followed a suppurative otitis media.

The prolongation of bone conduction, the negative Rinne, the raising of the lower tone limit, together with the paracusis Willisii, point to a considerable degree of fixation of the foot-plate of the stapes in the left ear. How could such a state of affairs have come about? There are three chief avenues by which infection can extend from the middle ear into the labyrinth. They are: the fenestra rotunda, the fenestra ovalis, and direct extension through the bony wall of either the lateral semicircular canal or the promontory. Of these the two former would seem to be the more likely routes in this case, for the fenestra rotunda is closed by a delicate membrane only, and the fenestra ovalis by the foot-plate of the stapes and its annular ligament. These structures

would appear to offer less resistance to infection than the layer of dense bone surrounding the labyrinth.

There seems to be, as Jansen has pointed out, and as I showed in my paper on Labyrinthine Involvement in the Course of Mumps,<sup>1</sup> a distinct tendency for labyrinthine inflammations to be limited at the junction of the vestibule and cochlea. With this tendency to limitation of the inflammatory process at this point we can see how inflammation invading through the fenestra rotunda could be limited to the cochlea, and how inflammation entering through the fenestra ovalis, as it could easily do if the stapes were dislocated during a mastoid operation, might involve the vestibular apparatus and only cause such cochlear disturbances as would be due to new-formed connective tissue in the vestibule and around the foot-plate of the stapes interfering with the entrance of sound waves into the cochlea.

The case presents another question for consideration, namely: Under what conditions is one justified in doing a radical operation on the only ear with which a patient hears? This, however, is a question I do not wish to discuss at this time beyond calling your attention to the serious results that may follow a radical operation in such a case as this, particularly if the stapes is disturbed.

#### REFERENCE.

1. Boot. Non-Suppurative Involvement of the Labyrinth in the Course of Mumps. *Journal of the American Medical Association*, December 5, 1908. No. 800 Davis Street.

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#### **Caries of the Mastoid Simulating Prolapse of the Sinus.** HERMANN BEYER. *Archiv f. Ohrenheilkunde*, May, 1905.

About three years after a radical mastoid operation had been successfully performed, in which the sinus had been exposed, pain and tenderness reappeared in the scar. A bluish swelling appeared in the region of the sinus, which seemed to increase in size when pressure was made on the jugular vein. Upon operation it was found that the sinus was completely covered with new bone, and that the swelling was caused by granulation tissue, resulting from suppuration in some of the terminal mastoid cells, which had been overlooked at the time of the original operation. YANKAUER.