

FOCAL INFECTION IN THE ETIOLOGY OF
LABYRINTH DISEASE.*

BY GEORGE E. SHAMBAUGH, M. D.,

CHICAGO.

In recent years a great deal has been done to clear up the various problems in the physiology of the internal ear. With this has come a better understanding of the symptoms arising from disturbance in function when the labyrinth is invaded by disease. We experience, as a rule, little difficulty in diagnosing cases of labyrinth disturbance and of reaching a more or less satisfactory conclusion regarding the probable nature of the pathologic changes which have taken place. The diseases of the labyrinth which we readily recognize include labyrinth involvement from suppurative disease of the middle ear or from meningitis; injury to the labyrinth, either through a fracture of the base of the skull or when operating on the middle ear; syphilis of the internal ear; otosclerosis with labyrinth involvement; degeneration in the labyrinth following long standing obstructive middle ear deafness, the degeneration in the labyrinth occasionally following the infectious fevers, as well as occupational deafness.

There remains a group of cases in which the labyrinth disease occurs in patients who have had no middle ear trouble and no general disease to account for the labyrinth involvement. In some of these cases the symptoms arise from disturbance limited to the cochlea; in others the symptoms are from involvement of the vestibular apparatus alone, while in many of the cases there is a disturbance of the whole labyrinth. The symptoms arising from the involvement of the cochlea are nerve deafness and usually tinnitus aurium. The deafness may be very insidious in its progress, in which case the tinnitus may be very slight or even quite absent. In many

*Read before the American Otological Society at its Forty-eighth Annual Meeting, at Niagara Falls, June 4, 1915.

of the cases the progress of the deafness takes place chiefly by acute exacerbations which occur as distinct apoplectiform attacks, and in these cases the tinnitus is always more marked immediately following each separate attack. In a few cases the first attack destroys permanently the function of hearing. The accompanying tinnitus aurium in such cases gradually diminishes, but often lasts for a period of years before entirely disappearing.

The symptoms arising from disturbance of the vestibular part of the labyrinth are those of disturbed equilibrium, the result of the imbalance occasioned by the partial or complete suppression of tonus from one labyrinth. This disturbance is always temporary and occurs as the sequel of an acute exacerbation of the vestibular involvement. In cases where the vestibular involvement is very insidious in its development the symptoms of disturbed equilibrium may be entirely absent.

The clinical picture from this group of labyrinth cases differs, therefore, very widely, depending upon whether the trouble is insidious in its development or whether it is punctuated by distinct apoplectiform attacks, and upon whether the disease involves both parts of the labyrinth or is restricted to either the cochlea or the vestibule. When the disease is associated with acute exacerbations involving the whole labyrinth, it gives rise to the group of symptoms which are commonly known as the Meniere symptom complex—that is, deafness, tinnitus and vertigo. When the disease involves both parts of the labyrinth, but progresses without acute exacerbations, the only symptoms are deafness and tinnitus.

It is in regard to the etiology of this group of labyrinth cases that I wish to call your attention. Meniere was the first to associate the attacks of vertigo, when combined with deafness and tinnitus, with disease of the internal ear. He believed that the disturbance was the result of hemorrhage in the labyrinth. That a hemorrhage into the labyrinth may produce this group of symptoms no one now will deny, but there are no grounds for believing that this is the actual pathologic change which takes place in these cases.

Some of these cases are called essential neuritis, others are designated as chronic progressive labyrinthine deafness, but there is nothing in either of these terms to suggest the cause of the changes going on in the internal ear. When we

seek to find analogies for these internal ear degenerations among diseased conditions found elsewhere in the body, we recognize at once the similarity between the phenomena observed in these labyrinth cases and the chronic degenerations which occur as the result of focal infection. Recent investigations have shown that chronic arthritis and neuritis, chronic cardiovascular degenerations and chronic nephritis are the result frequently of chronic latent foci of infection, the presence of which is often not suspected by the patient, since they often produce very slight or no local symptoms.

In all of these systemic diseases there is the chronic progressive character, punctuated, as a rule, from time to time by acute exacerbations, which are accounted for by a fresh shower of bacteria discharged from time to time into the circulation from the infected focus. These bacterial emboli lodge now in one part, now in another, through some as yet unknown predilection. Sometimes only one part, as a single joint, is involved; in other cases several structures are simultaneously affected.

To account for the phenomena observed in many of these cases of internal ear disease as the result of focal infection we have only to assume that the endings of the eighth nerve may be the structure peculiarly susceptible to the bacteria liberated from the infected focus. Each fresh shower of bacteria liberated into the circulation produces a sudden depression of function, either in the cochlear or vestibular nerve endings, separately or in both simultaneously. With each attack the patient experiences a defect in the hearing, associated with tinnitus aurium, when the cochlea alone is involved, or there is a disturbance of equilibrium with vertigo resulting from the one-sided suppression of labyrinth tonus when the vestibular apparatus is involved. When both the cochlear and vestibular endings are simultaneously affected, we have as a result the complete picture of the Meniere symptom complex—that is, deafness and tinnitus with vertigo.

A single attack may occasionally be severe enough to produce a total permanent suppression of function in the affected labyrinth. Here, in addition to the total deafness in the affected ear, there will be a severe tinnitus, which, diminishing gradually after the attack, may still require years before it entirely disappears. The vertigo occasioned by the sudden

complete unilateral suppression of labyrinth tonus will be very marked, but will also gradually disappear, rarely lasting more than a few weeks or months. In such cases, where the single attack causes a complete destruction of function in the affected labyrinth, there will, of course, be no subsequent attacks, unless the other ear should later become involved.

In most of the cases there is but a partial suppression of function resulting from a single attack. Here the deafness, as well as the tinnitus, are most marked immediately following the attack, but neither disappears entirely, as a rule, even after a long period. The vertigo usually disappears rather promptly after a few days or weeks. In these cases of partial suppression of labyrinth function there will very likely be subsequent attacks, provided the focus of infection persists. In some cases the attacks with the Meniere symptom complex persist at irregular intervals over several years, associated always with an increasing loss of function. The attacks may cease only after the function of the affected labyrinth has been completely destroyed.

With this conception that the internal ear may be the target for a systemic infection of focal origin, we have at once a plausible explanation not alone for the chronic progressive character of the degeneration going on in the labyrinth, but also for the apoplectic attacks with which these degenerative changes are so prone to be punctuated.

The possibility that some of these labyrinth cases of unknown origin may be caused by focal infection cannot be denied. It behooves us, therefore, when examining these labyrinth cases of obscure origin, to make a careful search for foci of infection, just as we have learned to do in cases of rheumatism and allied conditions.

The focus for these systemic infections is usually found in the faucial tonsils or in abscesses around the teeth. When the tonsils contain the foci producing the systemic infection, there is very often a history of recurring attacks of acute tonsillitis. In some of the cases the patient will admit having recurring attacks of "sore throat," but denies ever having had attacks of tonsillitis. As a matter of fact, the recurring attacks of sore throat are usually mild attacks of tonsillitis, as can be readily determined by examining the pharynx during one of these attacks. It is, however, not uncommon to obtain

no history of sore throat, and yet a careful examination will disclose unmistakable evidence in the faucial tonsil of chronic infection. In some cases this evidence is the presence of pus, which can be expressed from the tonsil. In others the congested appearance of the tonsil indicates clearly the presence of an infection. Such tonsils may be enlarged, but often they are distinctly shrunken and smaller even than the normal tonsil.

When the focus of infection is located about the teeth, it not infrequently requires the use of the radiogram to discover the abscess.

Since this relation between foci of infection and disease of the internal ear suggested itself to me several years ago, I have had the opportunity of examining a large number of these cases of internal ear disease of obscure origin, and have already collected a number where the presence of such chronic foci of infection could be demonstrated, which our experience has shown to be capable of producing systemic infection. I will give briefly the history of three typical cases.

Case 1.—Mr. S., aged forty-four years, seen in April, 1912, because of a sore throat. Faucial tonsils had been operated on five years before. Large stubs had been left on both sides. Tonsil on left side congested. On pressure pus could be expressed. June, 1914, he consulted me because of a soreness in the left tonsil which had persisted after an acute tonsillitis a few weeks before. Pus expressed from the left tonsil showed pure culture of *streptococcus viridens*. Patient had an acute swollen joint in the forefinger of right hand. Ten days later had an attack of vertigo with nausea, which confined him to the house for several days, slight tinnitus aurium, but no defect in the hearing. *Membrana tympani* normal and no evidence of middle ear disease. Patient seen again in October, 1914. Had developed rheumatic soreness in several joints, including hands, neck and knees. Pus still found in left tonsil. Tonsil stubs enucleated November 7th. Pure culture *streptococcus viridens* grown from the tonsil. Following the operation the rheumatism disappeared for two months, when he began to have recurrence. The Roentgenogram disclosed a tooth abscess. The tooth was removed. Pus from the abscess gave pure culture of the *streptococcus*

viridens. The rheumatism disappeared promptly after the removal of the focus of infection under the tooth.

Case 2.—Mrs. L., aged fifty-three years, consulted me October, 1911, because of defective hearing. The trouble had developed suddenly three years previous in association with an acute peritonsillar abscess on the right side. She had experienced a sudden attack of deafness and tinnitus in the right ear, associated with vertigo and sensation of objects moving before the eyes. Examination showed drum membranes normal, and the functional tests disclosed complete deafness in the right ear with slight loss of hearing in the left.

Case 3.—Mrs. M., aged sixty-eight years, consulted me May, 1914, because of a very severe attack of the Meniere symptom complex, during which the vomiting had lasted for twenty-four hours. History of similar but lighter attacks for several years. Has been somewhat hard of hearing for a number of years. Has had chronic articular and muscular rheumatism for several years. History of recurring sore throat. Tonsils were small, but presented the congested appearance characteristic of tonsils the seat of chronic infection. Pus was expressed from the right tonsil. Both ears hard of hearing. Whisper not heard in left; heard in right about two feet; deafness of the labyrinth type.