THE TYMPANO-MASTOID OPERATION IN CHRONIC SUPPURATIVE OTITIS MEDIA.*

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In talking with those who treat the ear and in looking over the literature of suppurative otitis media one is impressed with the number of different plans of treatment recommended and the great variety of medicinal agents in the success of which their respective advocates seem to have implicit confidence. That many cases of chronic suppuration even of long duration, are cured by these so-called conservative methods is well known to all. That many cases have been treated by such methods for a long period of time and still continue to discharge, is equally well known. The great majority of cases found in the latter class undoubtedly accounts for the belief found both among the laity and among physicians that little or nothing can be done for discharging ears. When a patient with a chronic suppurating ear applies for treatment the first question to decide is not what remedy to use but whether this is a case for conservative or surgical treatment.

As our diagnostic ability increases our reputations will suffer less from unsuccessful attempts to cure surgical cases by non-surgical means. In the present state of our knowledge it is not always possible to determine at the first examination in which class a given case belongs.

The pathologic conditions which nature cannot be expected to correct without the help of the surgeon may be enumerated as follows: 1. Bone necrosis either in the ossicles, attic, antrum, or mastoid. 2. Granulations or polypi within the deeper cavities of the middle ear. 3. Osteosclerosis of the mastoid. 4. A lining of the deeper cavities of the middle ear with epidermis either with or without cholesteatoma. Sometimes only one of these conditions is present; again all may be found in a single case. Sometimes the surgical cause of the suppuration is easy and sometimes difficult of recognition. When a surgical cause for the continued suppuration cannot be discovered it is perfectly proper to treat the case conservatively until it is cured, or until it becomes apparent that there is some condition present which will require radical measures.

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The treatment of chronic suppurative otitis media may be classified as: 1. Mechanical, including attempts at cleansing and drainage of the cavities of the middle ear. 2. The use of medicinal agents supposed to have germicidal or healing properties. 3. The use of internal remedies either for building up the general health of the patient or for their more direct effect upon the suppurative process. 4. The surgical treatment which includes the removal of granulations or polypi from the auditory canal and middle ear, enlarging the perforation to secure better drainage, ossiculectomy, the removal of the plate of bone between the attic and the inner end of the auditory canal, and the radical or tympano-mastoid operation.

As distinguished from the ordinary mastoid operation the tympano-mastoid includes not only a clearing away of all diseased tissue within the mastoid process but the removal of the posterior and superior wall of the auditory canal, removal of the drum membrane, malleus and incus together with the outer wall of the attic. This turns the mastoid, mastoid antrum, attic, middle ear, and auditory canal into one cavity which is expected to become lined with skin.

When to undertake the tympano-mastoid operation for the relief of chronic suppuration is a question which must be settled upon its merits in each individual case, but as a rule such an operation should be resorted to in all cases which cannot be cured by less radical measures. As exceptions to this rule may be mentioned those suffering from well-advanced pulmonary or other organic disease, and the very aged who have had suppurative otitis media for a long time without apparent inconvenience.

In addition to the continued discharge after other plans of treatment have been thoroughly tried, persistent odor is a special symptom pointing toward the necessity of radical operation. Odor means decomposition, and decomposition means accumulation, and accumulation means failure in the efforts to drain or disinfect the deeper parts of the middle ear. So when a short course of treatment fails to relieve the odor it should be considered an unfavorable indication.

Pain in the ear, in the mastoid or in the side of the head may be slight or severe, may be continuous or intermittent. When present it points toward the necessity of an operation but the absence of pain is by no means an indication that a radical operation may not be required. The same may be said of temperature although it is the rule for patient with chronic suppuration especially with odor to have slight elevation of temperature at some time during every twenty-four hours. Tenderness upon pressure over the mastoid as a symptom is unreliable since it is found when the mastoid is not dis-

eased and may be absent when the entire mastoid is necrotic leaving only the outer table intact. However, as a general indication tenderness on pressure when taken with other symptoms points toward surgery.

When auscultation of the mastoid by means of the stethoscope and tuning fork shows any change in the normal density of the bone it is additional evidence of the necessity of operation.

The discovery of necrotic bone in the mastoid or deeper parts of the middle ear is a positive indication for the operation. When the perforation is of sufficient size necrotic bone may be searched for with a probe or the washings from the ear may be filtered and the debris examined with the microscope for bone cells. When the discharge is slight and evidence of necrosis is found in the ossicles the ossicles may be removed. The prognosis in such cases is fair, but unless great care is used in the selection of cases for ossiculectomy the results will be disappointing, as many of the cases will either not be cured or will later submit to a more radical operation.

A sinus is frequently found in the posterior wall of the auditory canal leading back into the mastoid. The mouth of the sinus is usually marked by a small mass of granulations though sometimes the granulations will take a polypoid form and entirely fill the auditory canal. After the granulations have been cleared away a bent probe can be passed into the sinus when its real character will be revealed. Such cases may pass for ordinary suppurative otitis media even when the drum membrane is intact and the middle ear is practically normal. When such a condition is present it is useless to waste time with non-surgical measures.

When masses of exfoliated epithelium or cholesteatomatous masses come from beyond the cavity of the middle ear proper it is useless to delay operation in the hope of a cure by the ordinary plans of treatment.

The direct objects of the operation are: 1. The removal of all diseased tissue. 2. To provide for free and permanent drainage. 3. To improve the hearing when it is possible. 4. To relieve the patient of the menace to his health and life which the presence of pus in his ear continually subjects him.

There are certain dangers connected with the operation which should not be under-estimated. Probably the greatest danger with the majority of operators is the negative danger that the operation will not be thoroughly done and hence fail to bring about a cure. The direct dangers are: 1. To the facial nerve. 2. To the horizontal semi-circular canal. 3. To the lateral sinus. 4. To the

middle fossa. 5. To the internal ear by accidental removal of the stapes.

Probably the greatest of direct dangers is facial paralysis from injury to the seventh nerve. Much has been written regarding the location and course of this nerve and many rules have been given for preventing injury to it. In the writer's judgment there is but one rule worthy of consideration for preventing injury to the nerve as well as to other important structures and that is to know where they are and keep away from them. The only practical way of becoming familiar with the location of these structures is by a study of the surgical anatomy of the temporal bone on the cadaver. Cadaver experience is more necessary for the skillful performance of this operation than for any other operation on the human body. In other operations the important structures can be seen or felt and then let alone, while in the tympano-mastoid operation to see is to destroy; hence the necessity in this operation of having the location of the structures clearly in mind and of being able to go close to them without causing injury. In no other part of the human anatomy are so many structures essential to the life, health and comfort of the individual found in so small a space. After having done secondary operations on a considerable number of cases where the first operation had failed to cure and after seeing many cases in which accidents had occurred, the writer is firmly convinced that no surgeon has any right to undertake a mastoid operation, except in an emergency, until he has prepared himself for such work by repeated operation on the cadaver. In cadaver work special attention should be given to the location of the nerve and horizontal semi-circular canal for it is usually fear of injuring these structures that accounts for the lack of thoroughness in operating which is necessary to bring about a cure.

When the nerve has been injured facial paralysis promptly proclaims the fact, but when the horizontal semi-circular is injured the symptoms produced are much the same as when the stapes is accidentally removed, viz., greatly impaired hearing and more or less persistent dizziness. The semi-circular canal lies immediately below a smooth rounded bony eminence in the floor of the mastoid antrum. In necrosis of the antrum this area is rarely affected, but in removing necrotic bone the eminence has been frequently removed either exposing or taking out a section of the canal. The discomfort to the patient from this accident is sometimes comparatively slight but in many cases the disturbance of equilibrium persists for months or years. Cases are reported in which by secondary operation the injured canal has been covered with a skin graft with complete re-

lief from the dizziness and return of the hearing to normal. In the cases of spontaneous relief from the deafness and dizziness it is probable that in the healing process the canal has been covered over and is protected by newly formed tissue. One suggestion regarding the location of the facial nerve if kept in mind will greatly lessen the danger of injury. The nerve lies in a canal, (sometimes in a groove,) in the inner wall of the middle ear just above the oval window and at the posterior border of the middle ear it turns directly downward (not outward) and emerges from the skull at the stylo-mastoid foramen. The nerve never lies external to the attachment of the posterior margin of the drum membrane. Facial paralysis sometimes follows the mastoid operation when the nerve has not been exposed. In other cases the nerve has been exposed either accidentally or intentionally without paralysis resulting. In two cases of facial paralysis from acute mastoiditis previous to operation prompt recovery from the paralysis followed operation with exposure of the nerve. It seems not improbable that concussion due to the vigorous use of the mallet may account for paralysis in some cases especially those in which the paralysis disappears in a few weeks. If a thin sharp chisel or gouge is used the hammering will be much lighter and the danger from this source will be materially lessened.

The question of what disposition to make of the skin of the posterior wall of the auditory canal is still the subject of much discussion. The method employed by the writer in the past few years is to make a tongue shaped flap of the posterior superior skin wall of the canal. This is done by making two parallel incisions through the entire length of the canal, one corresponding to the upper margin and the other to the lower margin of the bone removed from the wall of the canal. This tongue-shaped flap is turned backward and is caught and held in place by one of the sutures closing the post auricular incision. If the two incisions making the tongue-shaped flap are carried well out into the auricle and the soft tissue and cartilage when necessary removed from the back of the flap it gives the surgeon complete control over the size of the external auditory meatus.

A large meatus with free access to the mastoid cavity by complete removal of the posterior wall of the auditory canal makes immediate closure of the post-auricular incision a safe surgical procedure. When this plan is adopted the after dressing is conducted entirely through the meatus. The head bandage can usually be left off after ten or twelve days and frequently the patient returns to his work in two weeks. It is necessary to continue the after treatment until the cavity becomes dry and is completely lined with epidermis. It is true that some surgeons who once used the immediate closure

plan have abandoned it and now leave the wound open behind the ear. Inquiry has convinced the writer that their method of disposing of the posterior wall of the auditory canal did not give these surgeons free permanent drainage and perfect access to all parts of the operation cavity. During the healing process the cavity must be frequently inspected and exuberant granulations kept down either by cauterization or removal. Their removal can be accomplished by means of the sharp curette or the angular ear polypus forcep. When these granulations are permitted to form they keep the cavity from becoming lined with epidermis and thus indefinitely prolong the healing process. When they form and are allowed to remain on the inner wall of the middle ear proper they impair the hearing by preventing sound waves reaching the internal ear.

The prognosis as to hearing after the tympano-mastoid operation is often a serious question. When the function of the internal ear is normal and the granulations can be kept away from the wall between the middle and the internal ear the patient ought to be able to hear an ordinary whisper three or four feet away. When before the operation the whisper can be heard more than three feet no improvement should be promised, but when the whisper can be heard less than three feet, if bone conduction is good, it is safe to state that the hearing should be improved.

In cases of operation for acute exacerbation of a chronic otitis or for any condition of the mastoid or brain which has been preceded or brought about by a chronic otitis, the question of tympano-mastoid operation should be carefully considered. The ordinary mastoid operation may relieve the immediate trouble but frequently it does not stop the chronic discharge nor prevent a recurrence of the acute condition. Permanent relief in many of these cases can only be secured by thoroughly cleaning out both the mastoid and the middle ear.

In the time allotted a detailed consideration of the various aspects of the tympano-mastoid operation for the cure of intractable suppuration is impossible. The tendency of otologists in these cases is toward more radical measures and the profession generally is becoming cognizant of the fact that the cases which do not respond to cleansing medication and capillary drainage can be cured by the tympano-mastoid operation.

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