VII.

WHEN THE RADICAL MASTOID IS IMPERATIVE.*

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It is now nearly twenty years since the first radical operation was performed for chronic middle ear suppuration. During this time great advances have been made in otology. By operation we are now able to cure many of those old middle ear suppurations, prevent the development of complications, and also to treat brain abscess due to otitic origin. The modern radical mastoid operation means the complete obliteration of all diseased bone, the throwing into one large cavity of the middle ear, aditus, antrum and mastoid cells, thereby giving the patient a chance to recover from a chronic suppuration. The imperative indications are:

1. Caries or necrosis of the petrosa during the course of a chronic middle ear suppuration.
2. Cholesteatoma.
3. Intracranial complications occurring during chronic suppurative otitis media.
4. Whenever during the course of a chronic tympanic suppuration an acute exacerbation with mastoiditis occurs.
5. Labyrinthine symptoms.

Caries and necrosis follow the destruction of the mucous membrane. This is true, whether the disease at first was a simple acute catarrhal trouble, or purulent from the beginning. As a result of this we have an inflammation of the periosteum, with death of the bone. This is because the nutrient arteries of the bone and the vessels supplying the periosteum rapidly obstruct the circulation. Depending upon the occluded vessels for nourishment, the periosteum or the whole bone becomes necrosed, when it is either eburnized or eroded by the surrounding pus. Any profuse discharge from the meatus which has existed several months must come from the

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middle ear, and it goes without saying that the drum membrane is either perforated or destroyed. It is very important in what part of the membrane the perforation is. If it exists in the superior and posterior quadrant, it generally means that caries of the incus has occurred, granulations will form, closing off drainage from the aditus. This causes the pus to find its way into the pneumatic spaces, setting up a periostitis with more or less destruction of bone. If we have along with this cholesteatoma, the danger is increased, because the pressure from the growing mass may cause the absorption of the roof of the antrum, the bone in the posterior fossa, or the capsule of the semicircular canals, thereby causing an epidural abscess, a diffuse meningitis, a brain abscess, a sinus thrombosis or an inflammation of the membranous labyrinth. In three cases which I operated upon last year, all three of the semicircular canals were distinctly outlined; in two of them the facial nerve was also exposed, and one had a fistula of the horizontal canal. All this was brought about by the absorption of the bony covering, caused by pressure from the cholesteatoma. We feel that in all cases of chronic suppuration of the middle ear, when cholesteatoma is positive, a radical operation is necessary to save the patient from a further extension of the disease.

Primary tuberculosis of the ear is more often met with in poorly nourished and bottle fed babies. It is generally located first in the mastoid cells. The infection probably comes through the blood, or by way of the mucous membrane of the eustachian tubes. It comes on with very little pain and runs such a rapid course that palliative treatment is of little use. In order to save the life of the patient a radical operation must be done.

In regard to secondary tubercular infection of the middle ear, this develops most frequently in patients with pulmonary tuberculosis, and seldom with tuberculosis in any other part of the body. It comes on gradually and with little pain, yet the destruction is very great. The wall of the tympanic cavity and antrum resemble macerated bone, the labyrinthine capsule becomes necrosed, and by this means the life of the patient is placed in greater danger. If the patient is not in the advanced stage of tuberculosis, a radical operation should be done as the only chance of stopping a necrosis and preventing development either of a suppuration of the labyrinth or a tubercular meningitis.

Of all the sinuses the sigmoid is the one most often affected by the purulent suppurations. We may have here a perisinus abscess that will give no symptoms, and then we may have only a small opening over the sinus plate, which, not giving good drainage, retains the secretions. This produces an inflammation of the sinus wall, with high temperature. As the inflammation continues we have the formation of thrombi which extend often to the bulb of the internal jugular, causing pyemia and death, if not operated upon in time. We may have, either alone or with a sinus thrombosis, an extradural abscess, which is found either on the dura covering the middle or posterior fossa. In the majority of cases it is caused by the direct extension of the inflammation through the bone. The only treatment one can think of in such cases, when it is due to an old chronic ear suppuration, is radical operation and then the opening of the abscess.

Meningitis of otitic origin develops either after the formation of a fistula or from the inflamed external surface of the dura. It is a well-known fact that the dura is very resistant. If it were not so, we would more often have not only acute meningitis due to infection, but also to traumatism. The clinical picture of meningitis is not always the same, and often very difficult to diagnose from an epidural or brain abscess. As a rule, the disease begins with headaches, which are at first remittent, but in time spread over the entire head and become continuous. The patient may have continuous vomiting, sleeplessness and sensitiveness to noises. Lightly tapping the muscles calls forth an active reflex. The most prominent symptom which distinguishes this affection from all the other intracranial complications, and especially brain abscess, is the marked excitement which is made evident by screaming, springing from bed, trying to run away, picking at the bed-clothes, etc. The course of otitic meningitis, whether due to acute or chronic middle ear suppuration, is a very rapid one, especially in children. If fluid from a lumbar puncture is cloudy, it points either to a purulent meningitis, a superficial brain abscess, or pus in the ventricles. The absence of coagulation fibrin in a clear fluid points to a serous meningitis. A meningitis may be diagnosed early in its course by means of the biochemic tests of the cerebrospinal fluid, as described by Kopetzky. Otitic meningitis runs, with few exceptions, a fatal course. In circumscribed meningitis, when

it is caused by an epidural abscess, a cure is not out of question if the source of infection is removed by operation.

Brain abscess due to otitic origin is very difficult and often impossible to diagnose. The difficulties presented by the differential diagnosis between brain abscess and the different forms of meningitis are apparent from the observation of patients during life, and by the condition of the brain found at postmortem examination. In a number of cases one is able to make a diagnosis of abscess in the temporal lobe by the aid of certain marked symptoms, such as aphasia associated with a localized headache in the parietal region, tenderness on percussion, and increased temperature in the affected half of the skull. The prognosis of brain abscess until within the last few years has been very unfavorable. If the diagnosis is made in time, all the dead bone which was the source of infection is removed, and the abscess opened, before the appearance of serious complications, it is often possible to obtain a cure in a number of cases.

That facial paralysis is not of more frequent occurrence in chronic otitis is no doubt due to the greater resistance of the bony canal, and to its having a separate blood supply. When we do have a facial paralysis complicating an old chronic middle ear suppuration, it is generally caused by necrosis due to cholesteatoma, and should be operated upon at once.

Of the chronic middle ear conditions, cholesteatoma no doubt causes most of the labyrinthine infections. Next in frequency is tuberculosis, and then scarlet fever. Before doing a radical mastoid, when no labyrinthine symptoms appear, a careful functional test should be made, in case the patient after operation should develop any signs of a labyrinthine inflammation. When we have labyrinthine complications, the infection reaches the labyrinth by way of the oval window, round window, fistula of one of the semicircular canals, generally the horizontal, or a fistula of the promontory.

When labyrinthine symptoms do appear, such as nystagmus, vertigo, vomiting, fear of going up or down stairs, with a tendency to fall to the side of the diseased ear, a careful examination should be made with the functional tests in order to decide whether a radical operation should be performed alone, or whether it is necessary to follow the radical operation by a labyrinthine operation.