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CEREBELLAR ABSCESS.

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Pathology.—Acute infective disease of the middle ear and its adnexa, the tympanic antrum and mastoid cells, is rarely followed by involvement of intracranial structures for the reason that the pathological process set up is almost invariably confined to the mucosa and rarely involves the surrounding bony structures which act as a solid buttress against the spread of invading organisms.

In chronic infective lesions, however, the surrounding bony walls sooner or later become involved owing to the anastomosis which exists between the blood-vessels of the mucosa and the underlying bone. The result is that bone adjacent to the area of diseased mucosa becomes infected, necrotic or carious, exuberant granulation tissue forms, drainage is interfered with and gradual disintegration of surrounding structures takes place.

The route selected and followed by the advancing sepsis, and the virulence of the infecting organisms, largely determine the type of complication which may ultimately ensue. Should the infective process be mild, time is given for adhesions to form, for soft tissues to become cemented to surrounding bony tissues, and for an effective barrier to the spread of infection to be set up. If, on the other hand, the infective process is acute and virulent, no time is given for the exercise of this conservative effort on the part of Nature, with the result that the meninges are prone to become involved with a resulting diffuse purulent lepto-meningitis.

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Intracranial abscesses, both cerebral and cerebellar, are, therefore, rarely met with as a consequence of acute pyogenic infection of the middle-ear cleft. In almost every case the progress of disease from the infective focus is slow, the destruction of tissue insidious and painless. The relative frequency of cerebral and cerebellar abscess has been the subject of much statistical enquiry, with the result that, from a world-wide investigation of published records, it has been found that cerebral abscesses are twice as frequent as cerebellar. Individual experience may, however, be different, and in my own practice I have found cerebellar abscesses more than twice as numerous as cerebral.

Owing to the fact that infective lesions of the middle-ear cleft are more common in youth and early adult life, and that the formation of intracranial abscesses is as a rule a slow process, the decade during which they are most frequently met with is between the ages of 10 and 20. Males are more frequently affected than females, the proportion being two to one, and in my experience cerebellar abscesses are found more frequently on the left than on the right side.

The rôle played by labyrinthine suppuration in the production of a cerebellar abscess is an important one, the path of infection being either by way of the internal auditory meatus, along the aqueductus vestibuli, or as the result of the formation of a deep-seated extradural abscess.

The presence of an empyema of the saccus endolymphaticus, due either to extension of infection along the aqueductus vestibuli or from contact infection from the sinus or inner antral wall, is at times responsible for the formation of a cerebellar abscess.

To ascertain exactly the precise route of infection through the labyrinth is necessarily extremely difficult owing to the depth and anatomical relations of its individual components, but statistics prove that infection through the internal auditory meatus is the most frequent path.

The part played by sinus thrombosis is naturally, owing to topographical relationships, an important one, at least one-third of the cases in my experience being due to extension from this cause. The presence also of a perisinusal abscess, with or without the existence of sinus thrombosis, is also an important factor.

The frequency with which a cholesteatoma is met with in chronic septic otitis media, and the extent of the damage it

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may do by causing absorption of bone as the result of gradual pressure erosion, with consequent exposure of the labyrinthine spaces, and from suppuration in its immediate neighbourhood, makes its presence in any given case a matter of clinical importance; the more so as a cholesteatoma tends most frequently to form in the tympanic antrum and in that part of the temporal bone in closest relationship to the outer labyrinthine wall, the sinus and the posterior fossa.

The actual formation of an intracranial abscess is, generally speaking, a slow process, although the clinical picture may show certain acute phases, due probably either to œdema of the brain or to the presence of concomitant serous meningitis.

Cerebellar abscesses rarely attain any great size, certainly never such a size as cerebral abscesses. This is mainly due to the fact that owing, on the one hand, to the proximity of the rigid "tentorium" which tends to prevent expansion, and on the other hand, to the relative nearness of the cardiac and respiratory centres, a fatal issue tends to take place more rapidly and more suddenly than is likely to happen in the case of cerebral abscesses.

Fig. 1 depicts the enormous size to which a cerebral abscess may attain, while Fig. 2 shows a cerebellar abscess of average dimensions. Cerebellar abscesses are, as a rule, situated superficially and in intimate relationship with the focus of sepsis to which they owe their origin. Although a cerebellar abscess is as a rule single, instances of multiple abscess are not unusual (Ballance).

Encapsulation of chronic abscesses is the rule, the capsule consisting of proliferated connective tissue, neuroglia and freshly formed blood-vessels. Exceptionally a cerebellar abscess becomes absorbed, a linear cicatrix marking its original site. At other times it may rupture either into the meninges or into the fourth ventricle, or, from a sudden increase in its size, may induce sudden death from paralysis of the cardiac or respiratory centres. The writer has seen four such cases of sudden death, in each of which the fatal issue was apparently due to paralysis of the cardiac centre.

Diagnosis.—A cerebellar abscess may run a latent course, and is, in fact, more prone to do so than a cerebral abscess, and may lead to a fatal issue without its presence having even been so much as suspected. This occurs in about 10 per cent. of cases. The definite diagnosis of the presence of a cerebellar abscess is even more difficult than that of a cerebral

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abscess, and mainly because focal symptoms are less in evidence. Increase of intracranial pressure is the rule wherever the abscess is situated, but in cerebellar abscess the tendency for the brain stem to be thrust downwards into the foramen magnum is greater than in cerebral abscess, with the result that relief from lumbar puncture is not as a rule so marked as in cases of mid-fossa collections of pus. Such symptoms as headache, slow pulse, slow respiration, vomiting, and papillo-œdema have no differential value, being found at times wherever the abscess is situated. Retraction of the head, with rigidity of the cervical muscles, yawning and hiccough are, however, symptoms highly suggestive of pus in the posterior fossa.

Important diagnostic aid may, however, be gained from a careful study of homolateral sensory disturbances and lesions of Deiter's nucleus. The former tend to induce hemiparesis and hemiataxia on the same side of the body, the latter, nystagmus, vertigo and vestibular ataxia. In cerebellar abscess the existing nystagmus, although occurring towards both sides, is mainly directed towards the affected side just as happens in labyrinthine suppuration in its early stages. As disease in the labyrinth advances and the excitability of the vestibular apparatus diminishes *pari passu*, it changes over towards the sound side and remains directed towards the sound side until the labyrinth is totally destroyed. Rotatory nystagmus towards the affected side with a non-irritable labyrinth, but with symptoms of intracranial pressure, indicates the presence of a cerebellar abscess, while should the nystagmus be towards the sound side in cases where the labyrinth is non-irritable, the pathological lesion may exist either in the cerebellum or in the labyrinth, and until the labyrinth has been extirpated it is impossible to say in which. The pointing test has also a practical significance, indicating as it does the static condition of the vestibular system. If present, the deviation will be found to take place towards the same side as the slow component of the nystagmus, in other words, in a direction opposite to that of the existing nystagmus. A symptom to which attention has recently been called—dysdiadokokinesis—or a difficulty in pronating and supinating the hands is occasionally present, and if present, is of value. In typical cases Rombergism is marked and "toeing" the line is an impossibility.

Treatment.—Should a diagnosis of cerebellar abscess have been made, no time should be lost in opening up the posterior

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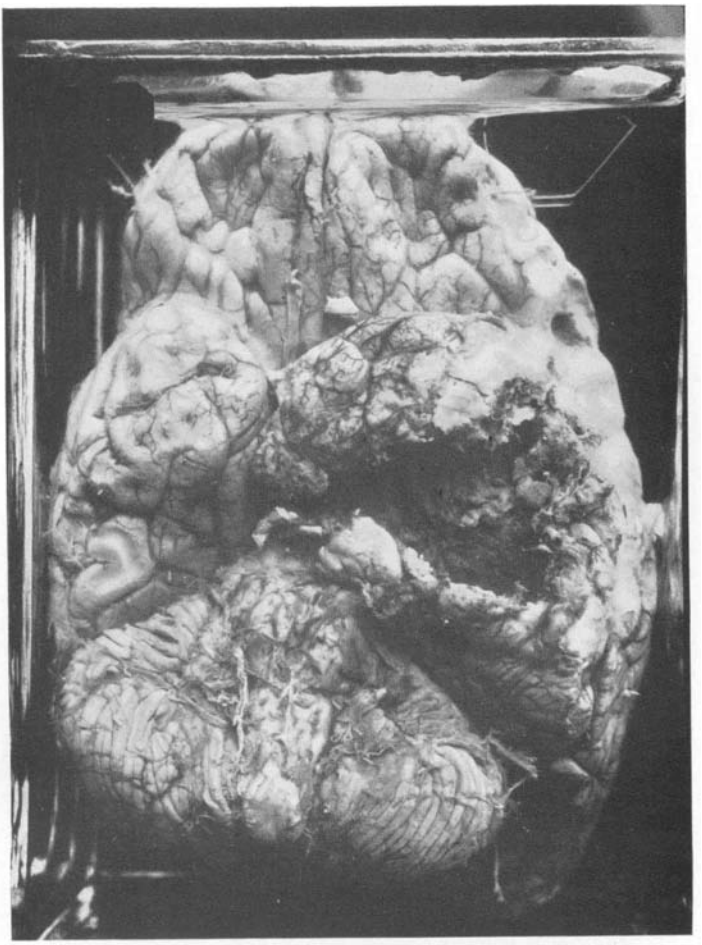


FIG. 1.—Large Temporo-sphenoidal Abscess.

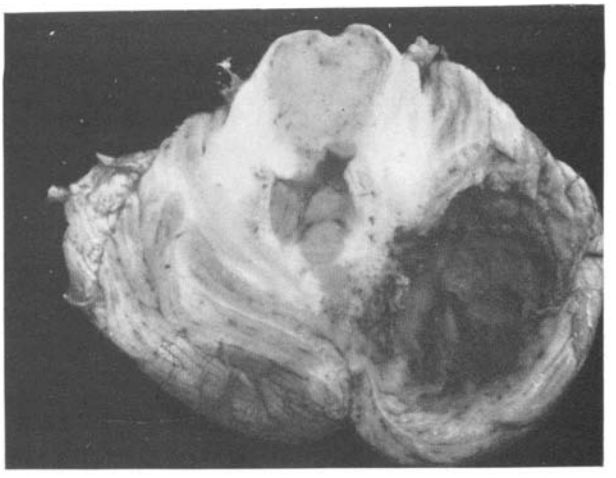


FIG. 2.—Cerebellar Abscess.

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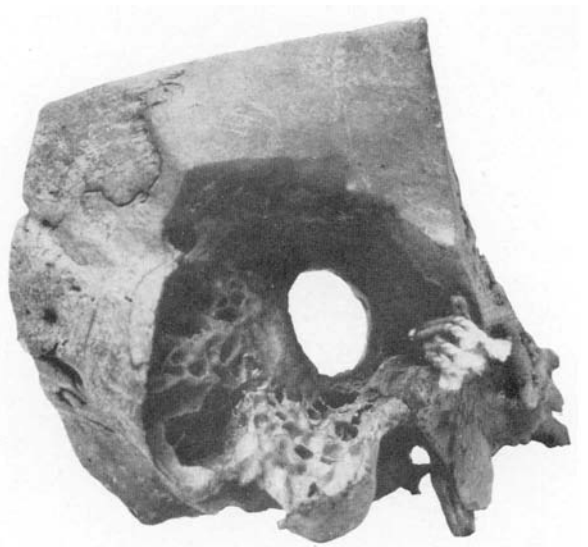


FIG. 3.—Shows opening made in temporal bone after the performance of the radical mastoid operation to expose the antero-inferior portion of the cerebellar lobe. The strands of silk are passed through the opened-up cochlea to show the route of translabyrinthine drainage.

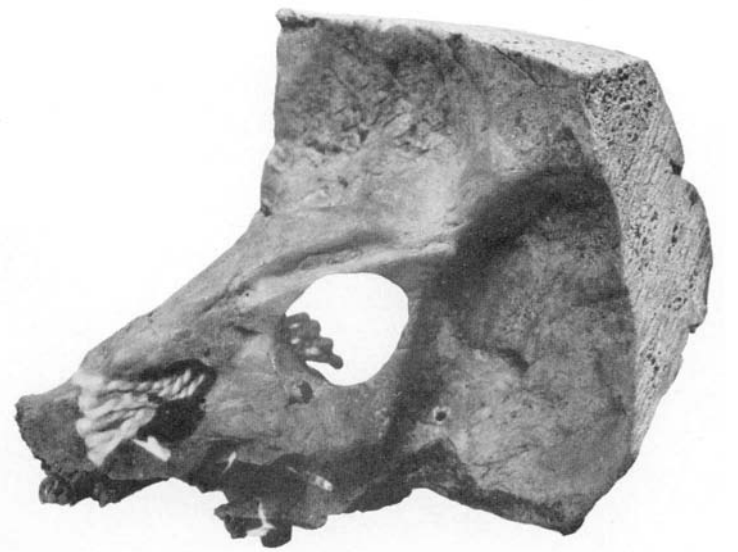


FIG. 4.—Same opening in temporal bone viewed from the medial aspect, showing its relation to the sinus and internal auditory meatus. Strands of silk show route of translabyrinthine drainage.

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fossa, as death may take place quite unexpectedly from sudden pressure on the respiratory or cardiac centre or on both. The writer's practice, as originally suggested,* has been to perform first of all a lumbar puncture in order to relieve intracranial pressure. Objection has been taken to this on the ground that by suddenly relieving the pressure the brain stem may sink into the foramen magnum with disastrous consequences, or that the sudden release of fluid may cause the abscess—often superficial—to rupture. Both objections appear to the writer to be theoretical rather than practical, while experience of lumbar puncture in many cases has shown its value.

In every case (with the exception of those where the patient is comatose, when rapidity in operating is essential) a radical mastoid operation should first of all be performed, and the lateral sinus exposed. The bone lying between the groove of the sinus and the internal auditory meatus should be freely cut away and as large an area of dura mater exposed as possible (Figs. 3 and 4). The advantage of this route of approach is that, in practice, twice as many abscesses are found located in front of the sinus groove as are found posterior to it, the disadvantage being that the area of cerebellar exposure is limited. After exposure, the dura mater is incised and the antero-internal portion of the cerebellar lobe explored either with a knife or a pus-searcher, preferably with the former. Punctures in several directions should be made. If no pus be found and yet clinical indications point to the presence of an abscess, an opening should be made behind the sinus and the posterior portions of the cerebellum investigated. To obtain as large an area of exposure of the cerebellar lobe as possible an attempt may be made to displace the sinus. If this is not possible it may be opened, plugged, and then resected.

During the performance of the operation respiration may suddenly cease. Artificial respiration should at once be resorted to and the posterior fossa opened up with as little delay as possible. So soon as intracranial pressure is relieved, spontaneous and natural respiratory movements will be found to recommence. If the operator succeeds in locating the abscess, pus should be allowed to escape slowly so as to permit of a gradual restoration of the normal intracranial tension.

The maintenance of successful drainage of an intracranial

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abscess, whether cerebral or cerebellar, is invariably fraught with difficulty, owing to the exit of pus being frequently interfered with from blocking of the tube with fragments of necrotic brain tissue or from collapse of surrounding brain substance. Some operators prefer to employ tubes (metal or rubber), while others pin their faith to strands of gauze packed into the abscess cavity. The writer's practice has been to employ a double-way silver tube (Fig. 5), its length and lumen varying with the size and depth of the abscess cavity. Frequent, if not daily, irrigation is required, one or other mild antiseptic lotion being employed for the purpose. The retention of the tube *in situ* for some considerable period is advisable, as time is required for the cavity to clear itself

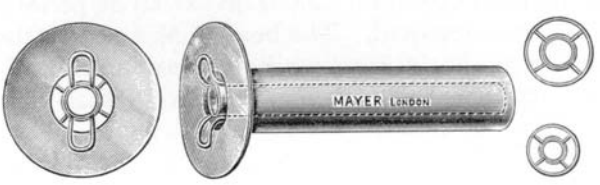


FIG. 5.

of all septic material and for collapse and agglutination of its walls to take place. As the tube tends to be thrust outwards during the contraction and healing of the cavity, it should be shortened from time to time.

In order to facilitate drainage and to prevent the formation of "dead spaces," Boenninghaus advises removal of the brain tissue—the cortex—intervening between the abscess and the opening in the bone, a somewhat hazardous experiment owing to the possible spread of sepsis. Counter-drainage, or the insertion of one tube in front of the sinus and another through a separate opening behind the sinus in cases of large abscesses, has proved of value in isolated instances.

Considering the fact that so many cases of cerebellar abscess are complicated by meningitis, thrombosis of the sinus or suppurative labyrinthitis, the prognosis must always be considered as grave. Probably not more than 30 to 40 per cent. of operated cases recover,* although happily results are gradually becoming more favourable owing to earlier and more accurate diagnosis and an improved technique.

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