SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

March 2nd, 1934

President—MR. W. J. HARRISON

Discussion on the Diagnosis and Treatment of Abscess of the Brain

The opening papers read by MR. HUGH CAIRNS and MR. CHARLES DONALD and MR. SYDNEY SCOTT are published in this issue of the *Journal of Laryngology and Otology*, Vol. L, No. 2, pp. 73-105 and 106-126.

MR. F. C. ORMEROD: In 1930 Professor Neumann addressed this Section on the subject of brain abscess.* He recounted his own experiences and those of many other otologists and showed that in the hands of most surgeons a recovery rate of about one-third of the cases of cerebral abscess was as much as could be expected. He recalled, however, that Sir William Macewen recorded some 80 per cent. of cures. In the case of cerebellar abscess, Macewen's results were 100 per cent. of cures in four cases, to which no one else has ever approximated. Professor Neumann suggested that possibly Macewen's procedure of opening the abscess at a second operation, after exposing the dura mater and painting it with carbolic acid to obtain adhesion, might be responsible for the difference. Mr. Cairns, speaking at the same meeting, suggested that another factor might be Macewen's method of opening the mastoid bone with burrs instead of with the mallet and gouge employed by most otologists. In thinking over the cases that had come under my care up to this time I had been struck by the fact that the only two—out of seven—cases of cerebral abscesses in which the patients had recovered had been treated first by a temporal decompression by means of a trephine and drainage, and had had a radical mastoid operation performed later when the brain abscess was practically dry. Both these patients were comatose on admission.

The other five cases were all treated by a mastoid operation followed, either immediately or remotely, by drainage through

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the mastoid wound. In an eighth patient, in whom the temporo-sphenoidal lobe was explored by the mastoid route, an abscess, lying rather more anteriorly than usual, was completely missed. I believe that this abscess might have been found by exploration through a temporal decompression. Of the five patients who died after drainage, one succumbed to rupture of the abscess into the lateral ventricle, with maniacal symptoms, one to spread of the abscess backwards, destroying the optic radiation on that side, and three to a diffuse encephalitis. None of the cases developed meningitis. Since the papers mentioned were read four years ago, I have had only one case of temporo-sphenoidal abscess, that is the case exhibited at this meeting (see p. 136). This patient, I believe, underwent the mastoid operation before the abscess developed, and at the subsequent operation the mallet and gouge were not used, but a very wide temporal decompression was carried out with bone forceps and the abscess was opened and drained high up on its lateral wall. I imagine that the abscess in this case began when the temperature rose, some four weeks after the original operation, and a rigor led me to perform what was, I now believe, unnecessary ligature of the jugular vein.

If one considers these nine cases of temporo-sphenoidal lobe abscess, one finds that in the three in which the abscess was opened without operation on the mastoid process and without any hammering, the patients all recovered. Of the six patients who were subjected to mastoid operation, five died of extension of infection into the brain-substance and one of an undrained abscess. I feel that the trauma of opening what is often very hard bone with mallet and gouge is very likely to injure, by a kind of *contre-coup*, the so-called capsule of the abscess which is very friable. Decompression by trephine is not likely to injure the capsule. In addition to this, exploration is more easily carried out by a wide decompression definitely made over the lateral surface of the lobe than from the mastoid wound or any—other than a very wide—extension. Drainage through the lateral aspect is also more direct and more easily carried out than through the mastoid wound. I believe that in most cases the track from the ear is completely closed by the time the abscess gives rise to symptoms.

The danger of meningitis in either method of approach seems very slight.

THE PRESIDENT said that the subject was fraught with so many difficulties that it would be possible to discuss them for days, and still be "in the wood".

With regard to exploration with the finger, he had had a striking lesson as to its value a number of years ago, in a case of cerebellar abscess. He explored with a Horsley's seeker but could not find pus, but with the finger he found a large abscess. The patient

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died and at the autopsy it was found that the seeker had passed right into and through the abscess four times. In another case he had found a second abscess when using his finger to explore the temporo-sphenoidal lobe; had he not used his finger this would have been missed. Even if pus had been found by other methods and the abscess opened, he considered it advisable to use the finger, if only to get some idea as to the size, etc., of the abscess.

The question of draining an abscess was most difficult. If a drainage-tube was used the brain closed down on it, drainage was unsatisfactory and there was great risk of pocketing of pus. Some years ago he began packing the cavity with bipp ribbon gauze, and removed a little each day, so that by the fifth or sixth day another strip had to be inserted. The first patient made an uneventful recovery, so did the second. The third did well until, when the cavity had become much smaller than it had been when the abscess was opened, he (the President) used a tube. Within twenty-four hours the temperature shot up, and the patient became very ill and died. In the next case the cavity was packed only, but a fatal result occurred. He had used packing in a number of cases with varying results, and, though he had not gone into the statistics, he thought it had proved more satisfactory than other methods of drainage.

Sir CHARLES BALLANCE said that Mr. Cairns had dealt with the treatment of brain abscess in general, a fact of immense advantage to members of the Section, because the best method of treating abscess in any part of the brain must also be the best method of treating brain abscesses of otitic origin. Incidentally all would agree with Mr. Cairns that a brain abscess was a tumour and that the ideal treatment was excision. He remembered a brain abscess which he had excised in the distant past. The wall was so thick that the abscess could be rolled about the floor as if it were a billiard ball. For such a tumour there could be no treatment but excision. Possibly some surgeons, on occasion, forgot that.

As to the statement that the finger was a clumsy exploring instrument for brain abscess, he (Sir Charles) would not admit that his finger was a clumsy instrument, rather he would say it was the best probe which had ever been invented. Often, with the finger, he had found a brain abscess which it had been impossible to detect by any other method. Sometimes no pus could be obtained from a brain abscess by trocar and cannula, but one could always feel where the tumour was.

Much had been said about the diagnosis of these abscesses. He was extremely interested in that point. The reason for thorough and repeated neurological examinations was to ensure

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accurate diagnosis and no delay in treatment. Early diagnosis and early treatment were life-saving. A sign or symptom not observed was not a sign or symptom not present. He remembered several cases of abscess not only of otitic origin, but also in the frontal region, in one of which the mastoid operation had been performed and in another of which the frontal sinus had been opened. The operations had been carried out when there were definite signs of inflammation intracranially and, in the face of those signs, it was of no use simply to perform a bone operation. The only intracranial inflammation which, he thought, would be resolved by a mastoid operation was serosal meningitis in cases of acute mastoiditis in which the dura was inflamed. Even then, the mastoid operation was not enough if there were symptoms indicating meningeal trouble; treatment was not complete without lumbar puncture.

In cases of brain abscess secondary to bone disease, the disease represented one continuous disease-process; in almost all cases, therefore, one should be able to follow the disease from the temporal bone, through the meninges into the brain. If that was done and the abscess drained through the abscess stalk, the patient would be cured. Such a patient, so dealt with, would be exposed to no risk of meningitis, and there was practically no cerebral hernia. He had also performed this operation when there was an abscess in the frontal bone due to infection of the frontal sinus.

Four years ago while he (Sir Charles) was staying with him, his illustrious friend Harvey Cushing had operated in a case of brain abscess. The diagnosis between abscess and tumour in that case was somewhat doubtful. The abscess was large and was excised completely. It would not be untrue to say that the patient was well in a week; he (the speaker) saw him moving about in the ward ten days after the operation. Mr. Cairns had said that such patients ought to be kept in bed for a long time, but it was not always possible to keep them in bed when they felt quite well.

He agreed with Mr. Cairns that the surgeon himself should do the dressing in these cases. The reason why he (Sir Charles) had been successful in his first case was that he went to the hospital three times daily—morning, afternoon and evening—to look after the patient; this routine he followed for more than a fortnight, and the man recovered. When dealing with brain abscess every detail of treatment should be carried out by the surgeon himself.

Mr. E. Miles Atkinson said that both the openers had emphasized the fact that in many cases there were no definite localizing signs until late in the disease; there were only general signs—in particular headache, varying in degree and situation. It was still not sufficiently realized that this absence of localizing signs applied to cerebellar cases as much as to cerebral.

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The reason for this, he (the speaker) maintained, was that cerebellar abscess was a cortical condition starting, not as Fremel had stated, between cortex and central white matter, but actually in the white matter in the centre of a lobule, and remaining confined to that particular lobule.

The localizing signs depended largely on œdema, and if the abscess was of a chronic type, with a fairly thick wall, there was little surrounding œdema, and therefore no localizing signs. Dr. Gordon Holmes had suggested in 1922 that the localizing signs in cerebellar disease were due to involvement of the dentate nucleus.

If this was so, then the fact of the abscess being situated in the cortex far removed from the dentate nucleus and with little surrounding œdema, provided the explanation why many of them showed none of the characteristic cerebellar signs. In view of this, it was a mistake to wait before exploring until localizing signs appeared.

Another point was the transience of signs; it was, indeed, a diagnostic point. A sign "here to-day, gone to-morrow" was of great value in diagnosis.

Mr. Cairns had mentioned the difficulty with regard to "abscess in the wrong place". He (the speaker) had had a case of frontal lobe abscess which must have been metastatic from the ear, for no other infective focus could be found. There were no localizing signs; there were only headaches and the cell-count in the cerebrospinal fluid. He explored the temporo-sphenoidal lobe and the cerebellum, but failed to explore the frontal lobe in which an abscess was ultimately found.

He was sure that meddlesome surgery, such as washing out the cavity with antiseptics, etc., only served to increase the surrounding œdema, which it should be one's object to avoid.

Mr. J. A. GIBB asked whether Mr. Cairns would propose a larger opening and a free incision of the dura mater in cases of brain abscess, with the idea that if the abscess had been missed it might come towards the opening.

Mr. F. HOLT DIGGLE asked whether Mr. Cairns had any objection to the use of a small scalpel for finding an abscess.

Mr. CAIRNS (in reply) said that when exploring for abscess something blunt must be used with which to appreciate resistance. If one was sure an abscess was present, a fine scalpel, used gently, would be useful for opening the abscess; Macewen used a scalpel. With regard to making a larger opening in the skull, that of course depended on what was found with the needle. If there was a deep-seated abscess, and one was not finding pus up to 4 cm. depth, it was futile to make a large opening. Deep-seated abscesses were best treated by closed drainage. If a catheter could not be got into the abscess, a stiff brain-needle should be left *in situ*

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for a few days. If there was an abscess near the surface, a larger opening could be made so that the abscess could be attacked under direct vision.

He had not had any experience of silver wire drains. Cahill, of Boston, had used them, and reported successful results from them. Neither had he (Mr. Cairns) used bougies.

With regard to dressing in these cases, when the mastoid was operated upon it might be necessary to disturb the dressings earlier, because of the discharge; for frontal sinus cases it was well to have a massive dressing.

He completely agreed with Mr. Sydney Scott's remarks about mastoid cases. Neurological surgeons did not contend that the mastoid should be disregarded, or that operation should not be done through the mastoid; often that was the right route, as it gave dependent drainage. But when there was doubt, exploration for temporal abscess should be made through a clean incision, the mastoid incision being sealed off. In some cases one was not sure about lateralization, and then both ventricles must be tapped. If both were greatly dilated, there was no supratentorial abscess; if one ventricle was collapsed and the other of normal size or larger, the abscess would be on the side of the collapsed ventricle.

He agreed that if the surgeon had a clear idea of what he wanted to do at operation, the battle in these cases was usually won or lost at the bedside in the stage of investigation before operation.

CASES

Cerebellar Abscess.—MAURICE SORSBY, F.R.C.S.

George D., aged 41, was admitted to hospital, *August 10th*, 1932, with symptoms of right acute suppurative otitis media. He gave a history of headaches and occasional giddiness for two months, but there had been an exacerbation of the symptoms during the last three days.

Operations.—A right myringotomy was performed the same day and was repeated five days later. As the patient obtained no relief from the headaches and giddiness, a mastoid operation was performed on *August 17th*, a week after admission. Pus was found in the few cells present and granulation tissue in the antrum. The dura mater and lateral sinus were exposed and found to be healthy.

Post-operative progress.—The headaches persisted, and the patient vomited for the first time on *August 24th*—a week after the mastoid operation—when definite signs of cerebellar involvement were noticed. Temperature subnormal; nystagmus to the right: dysdiadokokinesis on right; ataxy of right arm and leg. No papilloedema.

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A lumbar puncture on *August 24th* gave the following figures: 134 cells per c.mm.; all lymphocytes; protein 0·2 %; globulin increased; sugar content normal; chlorides 700 mg. %. No tubercle bacilli or other organisms seen. Wassermann reaction negative; X-ray examination of skull revealed nothing abnormal.

Patient's local and general condition remained unchanged except for occasional remission or diminution of above signs and symptoms. Mastoid wound healed; pulse varying between 60-80.

Two more lumbar punctures were performed with the following results:—

August 29th, 1932.—40 cells per c.mm., all lymphocytes; protein, 0.15%; chlorides, 750 mg. %. All other elements as before. No organisms seen.

September 16th, 1932.—12 cells per c.mm., all lymphocytes; chlorides 720 mg. %. All other elements as before. No organisms seen.

Cerebellar exploration.—On *October 10th*, exactly two months after admission into hospital, patient became suddenly worse, and a cerebellar exploration was undertaken and, on needling, pus was found. The abscess was opened and two drainage tubes were inserted. *Bacteriological examination of the pus.*—Streptococci present.

Post-operative progress.—The cerebellar abscess drained well; symptoms and signs rapidly cleared up. Patient was discharged feeling fit and well on *November 29th*, 1932.

Temporo-sphenoidal Abscess.—Leslie Powell, M.B.

T.L., aged 11. *History.*—Ten days' cold; vomiting; pain in left ear followed by discharge next day. Pain ever since. Temperature 102° to 103°. When seen by me, *January 1st*, 1934, was in a condition of cerebral irritability, curled up, resenting any interference and not speaking. Temperature 103·2°; pulse 108. Apparently not hearing watch with either ear. Right tympanic membrane normal; left showed perforation, pus, and mass of granulations. Left antrum dim.

Operation same day. Lavage of left antrum producing thick mucus; ear cleared of granulations. Lumbar puncture; no increase of pressure or cells.

2.1.34.—Placid; no symptoms; temperature 100·4°. No change in reflexes, no paralysis; could not produce words, but imitated actions and appeared to understand what was said.

Operation.—Conservative mastoidectomy (left); lateral sinus and meninges freely exposed. Meninges covered with granulations: not tense; extensive cells. Uneventful progress after this, but patient only said a few monosyllables and was apt to repeat them. Temperature normal after three days, and remained so.

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14.1.34.—Vomiting repeated. Discs blurred on nasal side. Hearing (right) good: speech improving; could do small sums; drew well. Right pupil slightly larger than left. Slight right facial paresis (lower).

15.1.34.—Vomited again: left frontal headache. Cerebrospinal fluid clear but under pressure.

16.1.34.—*Operation.*—Temporo-sphenoidal abscess found and drained (culture: pneumococci). Metal drainage-tube with flange —later replaced by rubber catheter end; cavity washed out daily with saline solution; steady improvement ever since; now talks almost normally; hears watch at 6 in. (left ear). Wound nearly healed and meatus almost dry. Skiagram taken after injection of lipiodol shows position of abscess; tube still in, but very little discharge from cavity.

Temporo-sphenoidal Lobe Abscess of Otitic Origin. —F. C. Ormerod, F.R.C.S.

Edward W., aged 14. Admitted to Westminster Hospital, *April 14th*, 1933, with symptoms of left mastoiditis. There was a history of two weeks' otorrhœa and of bilateral otorrhœa in early childhood. A cortical mastoid operation was performed the same day without any unusual features being noted. Convalescence was uninterrupted until *May 14th* when the temperature rose to 103° and varied between 99° to 103° until *May 21st* when it rose to 105° and the patient had a rigor. The mastoid cavity was re-opened the same day and a little extra bone removed. The sigmoid sinus appeared normal but on account of the rigor, the internal jugular vein was ligatured. The temperature returned to normal in six days and the pulse to only 100. The patient was well until *June 6th* when he became drowsy and irritable. On *June 7th* and *8th* the temperature fell to 97° and the pulse to 70. He complained of headache on the left side and vomited twice.

All reflexes were normal except Babinski's, which was doubtfully extensor. The ocular fundi were congested but there was no papillœdema. The cerebrospinal fluid was under increased pressure and contained thirty lymphocytes to the cubic millimetre.

On *June 8th* a large area of bone was removed from the temporo-parietal area by means of bone forceps, the mallet not being used at all on this occasion. A large temporo-sphenoidal lobe abscess was discovered by means of a record syringe and needle. It was opened and drained by an incision through its lateral wall. No attempt at drainage through the roof of the middle ear or mastoid antrum was made.

The abscess contained several ounces of thin, flaky pus, from which a non-hæmolytic streptococcus was grown. The abscess was drained by means of a roll of thin rubber tissue and was

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irrigated daily. The convalescence was uneventful from the date of the abscess being opened.

Otogenic Brain Abscess Secondary to Infection with the Streptococcus mucosus.—MICHAEL VLASTO, F.R.C.S., and I. VITENSEN, L.R.C.P., M.R.C.S.

Mrs. B., aged 45, first seen in out-patient department, *October 24th*, 1933. Both ears discharging: the left had been discharging for three weeks, the right for five days. Severe tinnitus; no pain; both drums red and thickened. Tinnitus diminished while patient was under observation, but deafness increased.

November 14th, 1933.—Aspiration paracentesis [I.V.]. Report on culture: *Streptococcus mucosus*, both sides.

Tinnitus and deafness continued to be severe and, in view of the nature of the infection, it was decided to drain both middle-ear tracts.

December 2nd, 1933.—Bilateral Schwartze operation. [Right M.V.; left I.V.] Both mastoid cell-systems filled with granulations. Culture from right side showed *S. mucosus*; culture on left side was sterile.

The patient had become gradually more deaf, and could not hear shouting. The deafness was of the middle-ear type. We had not previously met with such profound deafness of this type.

The wounds were granulating satisfactorily, and it was hoped that the hearing would return with the subsidence of the infective process, but the patient then took a turn for the worse. On *December 23rd* she complained of pain over the right temporal region; she appeared to be drowsy and her pulse-rate dropped from 50 to 60. On *December 28th* she was examined by Dr. G. Konstam, who reported as follows:—

> Complete deafness; very drowsy; when she is roused, it is almost impossible to fix her attention, although there are occasional lucid intervals. Pupils equal and react to light. Nystagmus to the right. Fundi normal. Weakness of the lower face on the left side. Weakness and increased tonicity of left arm. Cheyne-Stokes breathing. Diagnosis: right temporo-sphenoidal abscess. Lumbar puncture: 35 cells per c.mm.; polymorphonuclears 44%, lymphocytes 56%.

On the same day (28.12.33) abscess located [M.V.] about 2½ cm. from the surface, rather far back in the right temporo-sphenoidal lobe. About one ounce of pus came away and drainage was secured by a single small-bore drainage tube. "The pus showed a heavy infection with *S. mucosus*. It consisted mainly of broken-down brain tissue, polymorphonuclear cells being very scanty."

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The immediate recovery of the patient was dramatic. The day following the operation she wished to be on full diet and inquired when she was going home.

Present condition.—The patient has now completely recovered, and her hearing is so far restored that she can hear a loud whisper with both ears.

The case seems to us of interest for several reasons as, e.g. (1) Many points in connection with infection of the middle ear with the *S. mucosus*, which were referred to in a previous communication [I.V.]; (2) the short time (ten weeks) which elapsed between the original ear infection and the evolution of the brain abscess; (3) the intensity of the middle-ear type of deafness; (4) the dramatic, immediate and permanent recovery which ensued after the evacuation of the abscess.

We are indebted to Dr. R. R. Elworthy for all the pathological reports.

Mr. VLASTO said that the credit for first recognizing the gravity of the condition was due to his Registrar, Mr. Vitensen. Although middle-ear infection by the *Streptococcus mucosus* had been suspected from the clinical history of the case, the diagnosis was clinched after culture of the middle-ear aspirates. For that moment, past experience had taught them how seriously the case would have to be watched and that operative drainage of the middle-ear tract could not long be delayed.

The middle-ear deafness—so characteristic of *S. mucosus* infection—was peculiarly intense.

Cerebral Abscess an Unusual Symptom.

—J. ALDINGTON GIBB, M.D.

S.B., male, aged 17. Chronic otorrhœa since childhood. Recently suffered from severe headache. Admitted to hospital 24.11.29 for the mastoid operation.

On examination.—Discharge from left ear; membrana tympani almost completely destroyed; hearing good; no vertigo, nystagmus or Rombergism; no dysdiadokokinesis; reflexes normal; no sensory or motor aphasia. Eyes, nothing abnormal.

25.11.29.—Radical mastoid operation; extensive disease; foul smell.

1.12.29.—Rise of temperature; nystagmus, first degree; no intra-ocular changes. On looking left there was slight diplopia; this cleared up on the following day. As the temperature remained high, although there were no meningeal signs, lumbar puncture was performed: pressure +29. *Bacteriological report.*—Pus cells and intracellular diplococci. Culture showed pure colony of coliform bacilli.

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30.12.29.—Very cheerful; marked perseveration; chuckled to himself a great deal. From this last symptom I formed the opinion that there was an abscess in the temporal lobe the contents of which had not only leaked into the cerebrospinal fluid, but had in all probability found their way towards the tip of the temporo-sphenoidal lobe and intermittently touched the frontal lobe, the pressure apparently giving the patient a pleasurable sensation.

6.1.30.—Trephined one inch posterior to the external auditory meatus and half an inch above it. Exploration unsuccessful.

13.1.30.—Granulations in wound bulged and pus was seen to ooze. I deliberately removed about an inch of brain covering the flow of pus. *Bacillus coli* present in pus. Examination showed a smooth-walled cavity capable of holding about two drams of fluid. The main abscess cavity followed the posterior superior angle of the petrous bone, and communicated with a new tunnel-shaped cavity which was continued almost to the tip of the temporo-sphenoidal lobe.

It is of interest that, although no eye symptoms were ever present, on firm packing of the abscess cavity, there was a sensation of seeing "green stars" in the right eye. Subsequent progress was uneventful.

Mr. HERBERT TILLEY said that the Section was to be congratulated on the series of successes which these cases represented, especially since, as Dr. Neumann had pointed out in the address to which Mr. Ormerod had referred, it was extremely difficult to get a high percentage of cures in cases of brain abscess.

The case of rapid recovery after the evacuation of a cerebral abscess reminded him of the first case of brain abscess upon which he had operated. A girl, about 7 years old, was brought to the hospital in a comatose condition, and with a long history of a chronic discharge from the left ear. The symptoms suggested a temporo-sphenoidal abscess on the left side. A light anæsthetic was administered, and during its induction there occurred a profuse discharge of foul pus from the meatus. The mastoid antrum and cells were explored, their infective material was removed, the temporo-sphenoidal lobe exposed, the abscess more fully opened, and a drain inserted. Next morning the patient was sitting up in bed and singing. She made a rapid recovery.

Another case he might mention was one of temporo-sphenoidal abscess. This was opened and the patient recovered. Seven months afterwards, however, he began to develop epileptic fits, the aura preceding the attacks being that of a disagreeable smell. The patient, a young man, was in University College Hospital, and he (the speaker) asked the late Sir Victor Horsley to deal with this complication.

Sir Victor opened up the wound again, found the scar of the temporo-sphenoidal abscess, and removed it. That was twenty-five years ago, and the patient has had no recurrence of the fits.

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