ON A CASE OF ABSCESS OF THE TEMPORO-SPHENOIDAL LOBE OF THE BRAIN, DUE TO OTITIS MEDIA, SUCCESSFULLY TREATED BY TREPHINING AND DRAINAGE.

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A BRIEF history of this case will first be given, followed by the authors' comments.

A. W., aged 19, one of our museum porters, was admitted into University College Hospital, under the care of Dr. Gowers, on September 15th, 1886. His family history was excellent, except that his father had had a stroke of paralysis. His personal record was also good, he having had no illness except scarlet fever in 1875. Since then the right ear has discharged thin yellow fluid, on and off, small in quantity and offensive; it has been almost continuous in the cold wet weather of winter. On the last day or two of August, 1886, he began to feel very unwell generally, and complained besides of aching pain behind and around the affected ear. On September 11th he took to his bed, his temperature being 105° Fahr. The next day the temperature was 108°, and the following evening 99.4°. There was no history of constipation or diarrhoea.

On admission (September 15th) a careful examination revealed no impairment of any function of the central nervous system; the movements of the eyeballs were normal, and the pupils were equal; the latter reacted to light and accommodation; there was no ptosis, nystagmus,

creamy foetid debris. There was no further obstruction to this opening, and no sign of acute inflammation anywhere about the middle ear. The drum was opaque, and not congested. An injection of warm solution of sulphate of quinine was ordered, with a dressing of iodoform. There was no swelling in the mastoid or temporal regions, and only a little tenderness, probably due to the blister. From the morning of the 21st, the temperature had steadily fallen to 97.6° at 7 A.M. on the 23rd; it varied between this and 98.8° until the end of the month. The optic neuritis continued, and increased in degree, the papillæ becoming more swollen, with whitish spots on their surface. On the 25th, the patient became more dull, and required to be roused to answer questions. He had a severe attack of vomiting, without previous nausea. Temperature 97.6° in the evening. His pupils were now for the first time noticed to be unequal, the right being more contracted and sluggish than the left. There was no headache, and no squint. The optic neuritis was more marked. On the 27th, the symptoms were still more aggravated, but the temperature remained 98° throughout the day. On the 28th, Mr. Barker decided to open up the mastoid antrum and middle ear, search for matter in the latter, and wash it out and drain, if present. This was done in the usual way with a gouge at a point about half an inch above and behind the centre of the auditory meatus (Fig. 1, *z*). On opening the antrum, there was no gush of pus, but some came away on the instrument; and, on injecting the meatus, a quantity of curdy and very foetid material was forced out of the opening in the bone (*x*); and, on inserting a syringe into the latter, similar matter welled out of the meatus. Having then thoroughly washed out the middle ear with carbolic lotion, the whole area of operation was dusted with iodoform and dressed with salicylic wool, a drainage-tube being left in the opening.

The next day the patient was decidedly better, though still slightly drowsy; the inequality of the pupils less evident, though the right did not yet dilate as fully as the left. Temperature, 98.4° to 99°. The wound was dressed with boracic fomentations, and was draining well.

The day following, he was still better in himself and much brighter, having slept well, and suffering no pain. The pupils, however, remained as before, and the optic neuritis was steadily increasing in intensity. Temperature, 98.6°.

On October 1st, a silver drainage-tube was substituted for the rubber one in the mastoid opening (*x*).

On the 2nd, he was not so well, having had a restless night; there was no pain, but the patient vomited in the morning; bowels confined; drowsy. Temperature, 98.8° to 97.8.

On the 3rd the patient was drowsier, and had been slightly delirious during the night; he vomited a quantity of very offensive matter, resembling pus; no rise of temperature; no squint; no headache. During the 4th, he felt drowsy; the next day, more so. Temperature normal. While Mr. Barker was syringing out the middle ear, there was well-marked nystagmus to the left in both eyes, which ceased immediately after the injection was discontinued. In the evening, the temperature rose to 105°, and the patient had a rigor, lasting forty-five minutes. After this the temperature soon fell. Dr. Gowers, considering that the rigor and the intense optic neuritis, taken in conjunction with the almost negative result of the previous exploration, constituted evidence of the existence of a cerebral abscess, asked Mr. Barker to trephine and search for one in the temporo-sphenoidal lobe. This was done the same evening. In the first place, the meatus, wound, and middle ear were thoroughly cleansed by washing out with carbolic lotion (1 in 20), and dusting with iodoform. The incision of a week before was next met by another, running downwards and forwards, from above and behind, and a V-shaped flap was thus formed, with its base above. This was dissected up, and the bone was found perfectly healthy. A spot was then marked for the pin of the trephine just an inch and a quarter behind and an inch and a quarter above the centre of the meatus of the ear (Fig. 1, *c*). But, before opening the skull here, the soft parts were stripped off the bone behind the mastoid process, and the foramen for the mastoid vein (*i*) was specially examined. Everything in this region was found perfectly normal. The trephine was then used at the point indicated, which corresponded to the inferior posterior angle of the parietal bone close to the squamosal suture (Fig. 1, *c*). When the upper two-thirds of the disc of bone had been cut and cautiously elevated, the dura mater was found to be quite normal. That membrane was then divided with a knife and turned back, when the surface of the brain was seen to be unaffected, nor was there any fluid in the arachnoid space. The whole wound and the opening made by the trephine having been again thoroughly washed with strong carbolic lotion and dusted with iodoform, Mr. Barker thrust a hollow aspirator needle at (*c*) about the size of a No. 4 catheter, into the temporo-sphenoidal lobe in a direction inwards, forwards, and downwards. This was done slowly,

Fig. 1.—From a photograph of a dissection of the skull before exposing the brain. *a*, Reid's "base line" running from the lower border of the orbit through the centre of the auditory meatus. *c*, The exact point at which the pin of the trephine was applied to open the cerebral abscess, just behind the squamosal suture. *z*, The point at which the mastoid antrum was opened. *i*, The foramen for the mastoid vein. *o*, On the point below the inferior curved line at which the cerebellum should be explored if abscess arises in it.

diplopia, hemiopia, or strabismus. There was, however, double optic neuritis, slight in degree, but unequivocal. The hearing was normal, as also were taste and smell; there was only a trace of foetid discharge from the right ear. The respiratory and circulatory systems exhibited nothing unusual, nor did the digestive system, except a foul tongue and bad taste in the mouth. Urine healthy; no albumen or sugar; specific gravity, 1024. In the evening the temperature rose to 101°.

On September 16th, Dr. Gowers ordered a blister behind the right ear, also two grains of calomel. Temperature in the morning, 97.6°; evening, 96.2°. Pulse 52. The next day he had two grains of calomel, followed by a saline aperient. The temperature remained low all day, being 97.2° at 11 P.M. It rose on the 18th to 101.8°, but fell immediately, and remained nearly normal until 7 A.M. on the 21st. On the 20th, he had three grains of calomel. On this day, Mr. Barker saw him, and found a large perforation in the right membrana tympani in the anterior and upper segment; through this the middle ear was wiped out, and was found to contain a moderate amount of stiff

and when the point had reached about half an inch inwards from the surface of the brain, a curious bubbling sound was heard like the escape of gas through the needle, and a moment later thick, yellow, intensely foetid pus began to pour from it, and was received in a measure-glass to the extent of four and a-half drachms. When the pus had ceased to run, the needle was cautiously pushed a little farther into the brain, but, as no more fluid ran off, it was withdrawn, and a sinus forceps was at once slipped into the opening in the cortex, and was used to dilate it. On this, more pus flowed out, probably to the amount of two or three drachms. Then, to provide for very thorough drainage of the cavity, a small-sized Volckmann's spoon was introduced into it, and the cortex was scraped away to the extent of the opening in the dura mater. The whole area of operation was then washed and dusted over with iodoform as before, and a rubber drainage tube about two inches long, also dusted over with iodoform, was placed, with about an inch of its length, within the abscess. The V-shaped flap of skin was then cut away at its base so as to leave the trephine hole uncovered and perfectly free to drain. The external wound was dressed with carbolic gauze dusted with iodoform.

No nerve-symptoms were observed during the operation, though carefully watched for. It was noted, however, that at one time the breathing became very bad, but improved at once on the escape of the pus from the abscess, the pulse going up at the same time to 150.

The morning after operation, the following notes were made. "October 6th, fair night, less drowsy, optic neuritis still of the same intensity. Temperature 98.4°; pulse 90; no vomiting." The wound was dressed, and found to drain freely. Curiously enough, the pus from the abscess was now found to be perfectly odourless. On the 7th there was decided improvement in every way, except that the papillitis was still intense. Temperature from 97.8° to 100°. A silver tube, the size of a No. 8 catheter was now placed in the brain for drainage, instead of the rubber one, which was difficult to retain in place; about half an inch of the new tube lay within the abscess cavity. In the evening, while the middle ear was being washed out, nystagmus was again noticed. Mr. Barker remarked that he had seen this phenomenon in a similar case before, on washing out the middle ear. There were neither headache, vomiting, or other nerve-symptoms, and the intellect was quite clear. On the 8th, while the tympanum was being washed out, pain was complained of in the right eye, which the patient at once rubbed with his knuckle for relief. There was no alteration of the pupil at this moment. Temperature 98.4°. The next day the patient felt so well that he was given fish for dinner. On the 11th the brain was only washed out and dressed once, and the tube removed and cleared once, and whether *post hoc* or *propter hoc*, the temperature became subnormal, 97.6°; the pulse, however, was 100°. On the 12th the silver tube had slipped out, and was replaced at dressing. Nystagmus was again noticed, as before, during the cleaning of the cavity of the tympanum, but there was no pain in the right eye. Fomentations as before; bowels very constipated; temperature normal. On the 13th he appeared to talk a little more slowly than on the previous day, not answering questions at once; otherwise very well. Temperature 100°; pulse 90; bowels open. On the 16th a new silver tube with a flange was used, which could be fastened in position by a silk thread round the head. The cavity in the brain still appeared to be of considerable size, judging from the amount of the boracic lotion which ran back through the silver tube on each washing out of the abscess. Nystagmus was again noticed under the same conditions as before. The patient was improving very rapidly, and gaining flesh and colour. On the 19th, exactly a fortnight after the operation, the drainage-tube was left out of the brain-cavity, and the patient was allowed to get up. No ill-effect followed.

From this date onwards there is little to note, except that the patient improved rapidly in every way. The temperature was now normal, and remained so till the end of his stay in hospital. There was no trace of hernia cerebri at any time. The brain-abscess was still washed out daily with boracic lotion as before.

On the 20th, Dr. Gowers reported that the optic neuritis was much improved in every way, and by the end of the month it had almost disappeared.

The patient left hospital for the convalescent home on November 12th, thirty-eight days after operation, looking and feeling very well, and with the trephine wound quite healed. He was still to continue to wear a silver drainage-tube in the opening into the mastoid antrum, which was to be syringed out with boracic lotion daily as before, Mr. Barker wishing, if possible, to establish a permanent fistula into the antrum, and middle ear at this spot. The hearing, carefully tested in a quiet room the day before leaving the hospital, was perfect on the left side, and extremely good on the right. A watch was heard eight or ten feet off on the left, and more than a foot off on the

right side, and musical sounds much farther. There was no damage whatever to the nervous apparatus of the ear on either side, as tested with the tuning fork on the vertex; it was only the conducting apparatus on the right which had suffered. The right meatus was full of pus when the test was applied, so that much of the slight deficiency of hearing recorded was due to simple mechanical obstruction of the meatus.

REMARKS BY MR. BARKER.—When asked by Dr. Gowers to see this patient for the first time, on September 21st, I had no doubt that his condition was due to mischief starting in the middle ear, although the symptoms were much less marked than usual; but as to what particular form this mischief was taking, I was obliged to admit to myself that I was very uncertain. Four hypotheses presented themselves. The symptoms were due certainly either to (1) pent-up foetid matter in the middle ear and its mastoid offset, with septic absorption therefrom; (2) to phlebitis of the lateral sinus; (3) subdural abscess; or (4) abscess in the temporo-sphenoidal lobe of the brain, or in the cerebellum. I confess to having been inclined to the first or third alternative, and was not prepared to accept the last. The past history suited No. 1 exactly. Scarlatinal otitis media, lasting up to date; the cessation of the discharge with the onset of the severe symptoms; the heavy aching pain in the temporal and mastoid regions; and the fact that, though a large perforation existed in the membrana tympani, a quantity of stiff curdy debris blocked it and the tympanic cavity—all combined to make a very familiar picture. On the other hand, the fact that there was a large opening in the membrana tympani suggested a doubt whether enough blocking had taken place to confine much matter in the tympanum, and whether the drowsiness, optic neuritis, and dull pain might not be due to subdural abscess. The symptoms seemed to me hardly marked enough for cerebral abscess. For instance, the temperature, although it had been subnormal, was not persistently so; and the pulse had not been steadily slowed, though often below 60. A recent experience, too, in four cases in which the symptoms were very similar, and in three of which I trephined the mastoid antrum, and thus drained the middle ear, with a perfectly good result, even to the disappearance of previously well-marked optic neuritis in one of them, led me to think that Nos. 1 and 3 were the safest working hypotheses in this case. When, a week later, the patient's condition seemed to deteriorate, this view was acted on, and I explored the tympanic and mastoid cavities by cutting into the latter from behind, with the result of finding much inspissated matter and clearing it out. I felt, too, that, whether the cranium was to be opened or not, this cleansing of the tympanic ramifications must first be accomplished, in order to minimise the risk of meningitis if the more severe operation should be necessary; and I cannot but attribute the success of the latter in a great measure to the thorough cleansing of the adjacent inflamed cavity after the first operation on the middle ear. The fact that after the latter the patient was distinctly better for several days showed also, I think, that the condition in the middle ear contributed to produce part, at least, of the general symptoms. The persistence of the latter, culminating in the rigor of September 5th, with a temperature of 105°, certainly justified further search for pent-up matter; and to Dr. Gowers belongs all the credit of urging that it should be looked for. On the question where it should be sought for, if intracranial, my views coincided with his. From pathological experience, my own opinion agrees with his—that, in these cases of inflammation of the tympanic walls, intracranial abscess is more frequently found in the temporo-sphenoidal lobe than in the cerebellum or elsewhere; and this is only what might be expected, when we consider that the roof of the tympanum is usually the thinnest of all its walls, and that more small vessels pass from the petrous bone to the brain and along the squamous petrosal suture from the tympanum to the dura mater than elsewhere. Nevertheless, before actually opening the skull, I determined to make an exploration which I had made and found useful in a very similar case, and which, I am led to think, will often afford important evidence as to the situation of the intracranial suppuration in the future, namely, whether it is cerebral or cerebellar; that is to say, I exposed the foramen for the mastoid vein (*v*), remembering that, if there be inflammation on the posterior aspect of the petrous bone, it can hardly reach the cerebellum without forming a layer of pus under the dura mater of the lateral sinus. If this is so, the pus will escape by the mastoid foramen if the latter be exposed. This was the case in an operation I performed lately for opening the mastoid antrum, the patient being now practically well. I think that if, in suspicious cases, it were made the rule to examine the mastoid foramen, a good guide to the extent of the disease posteriorly towards the cerebellum would be found.

Not finding any evidence of mischief in this foramen, one source of

uncertainty was removed, and I had less hesitation in exploring the temporo-sphenoidal lobe and dura mater covering it. The spot selected for this operation was just one inch and a quarter above and one inch and a quarter behind the centre of the cartilaginous meatus of the ear (Fig. 1 c), Reid's "base line" ($\alpha\alpha$), running from the lower border of the orbit through the centre of the auditory meatus being taken as the most convenient basis of measurement. This point lay upon the inferior posterior angle of the parietal bone, and over the posterior part of the middle temporo-sphenoidal convolution, as proved afterwards by photographs taken of an adult skull, and of the brain underlying it *in situ* (vide Fig. 2 c). This, I knew from expe-

Fig. 2.—Photographed from the same skull with the brain exposed *in situ*. The lettering is the same as in Fig. 1. The point at which the opening was made in the cerebral cortex (c) is observed to lie on the posterior part of the middle temporo-sphenoidal convolution.

rience in the dead-house, would bring me down upon the most usual seat of abscess in the temporo-sphenoidal lobe, and also of subdural abscess, should the pus lie along the squamoso-petrous suture. It would also be above the posterior branch of the middle meningeal artery. In this particular case, too, this spot had the advantage of being somewhat removed from the opening (x) previously made in the mastoid antrum, which was still discharging very fetid pus, and would be therefore very likely to contaminate the surface of the brain, if an opening were made at all near to it. That it was possible to prevent this is very encouraging.

A silver drainage-tube was used in this case for the cerebral abscess, as it was found easier to introduce and retain in position than a rubber one.

The size of the abscess was at least that of a sphere one inch and three-eighths in diameter. I find by experiment that a body of that size displaces as nearly as possible six drachms. Now four drachms and a half were actually received in a measure-glass from the cannula, and at least one drachm and a half to two drachms must have been evacuated after the latter was withdrawn. Probably the abscess contained nearly one ounce of pus. The latter was intensely fetid. In thrusting the needle into the brain, I aimed inwards, forwards and downwards from the point of entry. Travelling in this direction, the point of the needle would eventually have nearly struck the roof of the tympanum at a distance in the adult of about one inch and a quarter from the surface of the brain.

As the pus was reached at about half an inch from the surface of the brain, it was not necessary to go farther; but, in an adult, it would always be safe to go as far as an inch and a half from the point and in the direction given above; and, by doing so, it would be almost impossible to escape striking any collection of pus present in the whole area most liable to suppuration, that is, between the squamous petrous suture and the roof of the tympanum.

So far as I can learn after careful search—with the help of Dr. Neale's invaluable "*Digest*," the *Centralblatt f. Chirurgie* from its commencement until now, Schmidt's *Jahrbuch* for the last two years, and Virchow and Hirsch's *Jahrbuch* for the same time—this appears to be the first case in which a cerebral abscess, due to tympanic suppuration, has been correctly diagnosed, localised, and evacuated by operation with complete success. Traumatic abscess of the brain has often been treated successfully by operation, but it belongs to a totally different category to the disease in question. If following fracture, whether simple or compound, it is easily diagnosed and localised; if

due to a blow without fracture, it may not be quite so easy to localise; but, at all events, if an error be made, the processes about it are not septic. But, in the above case, not only was there a difficulty in diagnosis and localisation, but the risks of operation were enormously enhanced by the intense foulness of the whole suppurative process in the temporal region; and the fact that a fetid septic abscess had to be opened and drained through a healthy portion of brain and the unaffected arachnoid space. That this should have been possible is extremely encouraging. The figures I have drawn from photographs kindly made of my own dissections of an adult skull and brain *in situ* by my friend Mr. Marriott. To insure accuracy, all measurements and markings were made on the parts before being photographed.

NOTE.—December 4th. Patient returned from the Convalescent Home to-day. He suffers no pain of any kind, and appears in excellent health, and is fat. Dr. Gowers reports that the optic neuritis has not yet quite disappeared, being practically in the same condition as when the patient left the hospital. Both wounds behind the ear are completely closed, and there is only a trace of moisture in the deeper part of the ear.

EXPERIMENTAL RESEARCHES CONCERNING PASTEUR'S PROPHYLACTIC.¹

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DR. HIME referred, at the commencement of his paper, to the difficulties which were placed in the way of scientific research in this country in all that concerned the life and well-being of man and the higher animals. Fortunately there was no difficulty in pursuing such researches abroad. For some months he had been, in Paris, engaged in studying Pasteur's method, and availing himself of the extreme kindness and generosity of the Professor in following the practice of his laboratory. The affability with which Pasteur received all comers, and the candour and want of reserve with which he explained and demonstrated his methods to all earnest inquirers, were in his experience unequalled, and worthy of imitation everywhere. It was unavoidable that the subject of rabies should be unfamiliar to the vast majority. It was not given to every man to have a supply of the virus at his disposal. The number of cases and deaths from rabies in this country was comparatively so small, that few medical men had ever seen one, and Pasteur's method of treatment was still unfamiliar to the general public, except through unscientific reports in the daily papers. Hence to some extent the attitude of the profession in this country, which had preserved a cold silence on the subject. Hence also the boldness of the few critics who had ventured to oppose Pasteur. One of these was a lady, who felt her belief in the existence and goodness of a Deity shaken by Pasteur's success. Spitzka, of New York, was another critic. His familiarity with Pasteur's method was strangely illustrated by his request, published in the *BRITISH MEDICAL JOURNAL*, to be informed what were the symptoms of rabies in the rabbit; while his experimental skill in the practice of the method was shown by his statement that it is "a very difficult matter to keep any rabbit inoculated with fresh brain material by trephining alive" (see *JOURNAL*, Oct. 30, 1886). Dr. Hime could assert, from personal knowledge, that there was no more difficulty in keeping a rabbit alive in such circumstances than in keeping an infant alive after vaccination. The interference with physiological function in the former case, if the operation were done by an operator skilled in the method, was nothing like so marked as in the latter, there being no fever, no loss of appetite, no restlessness, and no local symptoms. Another critic in this country had shown himself possessed of more dialectic skill, but he, too, was entirely ignorant of the practice of Pasteur's method; he had never seen the practice in Pasteur's laboratory; he had never seen any other person perform the inoculation; he had never done it himself, and had never seen either a living or dead rabbit which had been so inoculated; yet he could criticise the method, and take Pasteur to task (without a shadow of reason) for not performing control experiments. Having devoted himself to the study of the question for months in Paris, and performed numerous experiments, Dr. Hime related to the Society some which he desired to be regarded as types of many others having the same result. He had selected them because they were, he thought, important in themselves; and, further, they met the objections raised against Pasteur's method in this country. The facts which he would detail were all within his own knowledge.

That the disease in the rabbit from which Pasteur obtained his

¹ Abstract of a paper read at the Pathological Society on December 7th, 1886.