discharge occurred, but no hæmorrhage. The temperature did not rise above 99°.

August 10th to 12th. The temperature, which had previously been high at evening, but normal or nearly so all day, remained persistently between 101° and 103°. The general condition gradually became worse, though no rigor or vomiting occurred after the day following the operation. On August 12th at midday the neck wound was opened under chloroform (the skin had quite healed), and fœtid pus escaped from the situation of the ligatured vein. The upper part of the latter was dissected up for about 1½ inch and cleared of fœtid clot by syringing through to the open sinus. No improvement followed, the temperature remained persistently and continuously high, and death took place from exhaustion on August 17th without the development of any fresh symptoms.

Post-mortem Examination.—The vein was found to have been ligatured about one quarter of an inch below the common facial branch, which was firmly sealed with decolorised clot for about the same distance. The cardiac end of the divided jugular was sealed and occupied by a very small tapering decolorised clot not reaching as far as the innominate vein. The dura mater was unusually adherent along the sagittal suture. The longitudinal sinus was greatly dilated, being almost as large as a man's little finger; it contained only a little filamentous *post-mortem* clot. It was continued directly into the left lateral sinus, but communicated with the right lateral sinus at the torcular by a circular opening a quarter of an inch in diameter. The straight sinus was continued into the right lateral sinus. The clot in the left lateral sinus did not extend towards the torcular more than one inch from the trephine opening. The other sinuses were quite healthy and free from clot. The left sigmoid sinus and jugular vein still contained a little clot. One small spot on the inner wall of the sinus near the jugular vein was yellow and soft, and nearly perforated into the arachnoid space. The brain and cerebellum were nowhere adherent to the dura, and showed no sign of meningitis or abscess in any part. A very great excess of clear fluid escaped from the arachnoid space and from the Sylvian aqueduct on dividing the latter; but the convolutions of the brain were not perceptibly flattened. The left tympanum and mastoid antrum were well drained by the operation, but pus had extended into the vestibule and cochlea, and a large drop escaped also from the internal auditory meatus on dividing the seventh and eighth nerves. The right tympanum and antrum were full of pus and extensively carious. The dura mater covering both temporal bones was nowhere inflamed or eroded. Both lungs were partially collapsed at the bases. In the left base there were in addition a small patch of pneumonic consolidation and two small purulent foci the size of a pea. There was no pericarditis.

REMARKS.—This case illustrates well some of the problems and difficulties of the treatment of aural pyæmia. The diagnosis was clear; the sudden onset the severe and repeated rigors and vomiting, clearly distinguished it from the less dangerous forms of toxæmic disturbance which may accompany any case of acute otitis media. The difference is probably not merely one of greater or less severity of the inflammatory mischief, but of the relation of the process to the adjacent large vein. The occurrence of rigors probably means that large quantities of septic poison are poured directly into the veins by the thrombosis of its small tributary channels in the petrous bone. In many cases extension of the mischief leads to thrombosis of the sinus itself, thus forming an imperfect natural barrier to the further progress of the disease. It has, however, been pointed out by Ballance that severe typical aural pyæmia may occur without any thrombosis of the sinus, an observation repeatedly confirmed by others. It would at first sight appear that a radical operative treatment of the primary focus of disease in the temporal bone would be all that was required to arrest the pyæmia. Ballance, however, has shown that this is not so, and quotes cases in which, in spite of the most thorough treatment of the disease in the tympanum and mastoid antrum without dealing with the vein, the rigors continued, and the cases terminated fatally. He, therefore, emphatically recommends that in all cases of clearly-marked aural pyæmia the vein be ligatured and the sinus plugged whether it be clotted or not. With this recommendation most surgeons will, I think, agree, since the procedure merely carries out in an effectual manner what Nature in some cases imperfectly attempts.

In the present case the presence of bilateral otitis and the absence of local signs of phlebitis rendered the choice of side for operation difficult. Under the circumstances the choice of the left side was made on the only indication available—namely, the side of the mastoid abscess. The equal amount of disease found *post mortem* on the right temporal bone deprives this indication of much of its force. It is possible that venous absorption took place on both sides, in spite of the arrest of the rigors and the temporary improvement after the operation. Under these circumstances a free opening of the right antrum in addition to what was done on the left side might have averted the fatal result. For this measure, however, during life there was little indication.

The ligature of the vein in any case having been decided

on, it was clearly advantageous in many ways to perform this step before opening the mastoid antrum and lateral sinus. It was, however, a mistake to bury the upper end of the divided vein and to close the wound as was done. The object of the operation is to induce thrombosis of that part of the vein, and the clot cannot fail to become infected from above even if, as occurred in this case, the neck wound heals over it. The upper end of the vein should have been fixed in the wound until clotting had occurred, and then the clot could have been syringed out, as was afterwards done. It is worthy of note that the application of a pad to the sinus after opening it, although it arrested bleeding, did not induce coagulation. In order to insure this the plug must be actually inserted into the sinus. In this connection I may quote a remark by Mr. Arbuthnot Lane that "ligature of the internal jugular vein may stop the rigors only after the sinus has become thrombosed, and not till then."

In addition to the unexpected amount of disease in the right temporal bone, the *post-mortem* examination disclosed two other points of interest—namely, the unusual arrangement and communication of the cerebral sinuses, and the presence of what were evidently two small pyæmic infarcts in the lungs, in spite of the absence of thrombosis of either sinus before the operation.

In conclusion, I have to express my obligation to my friends, Messrs. R. K. Hogarth and F. Papillon, for their assistance in administering chloroform.

A CASE OF DOUBLE MASTOID DISEASE WITH SEPTIC THROMBOSIS OF THE LATERAL SINUS.¹

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THE following are notes of a case in which long standing suppurative disease of both ears was followed by septic thrombosis of one lateral sinus with some general pyæmic symptoms:

M. H., aged 24, married, was admitted into the Leeds Infirmary on September 15th, 1894. The friends who brought her were unable to give an accurate account of her illness, but stated that for four or five years there had been an intermittent discharge from both ears. Four weeks before admission a swelling had appeared above the left ear, and shortly after another behind the right ear. Since then she had complained of severe headaches, persistent vomiting, and constipation. A fortnight before admission she began to have shivering fits, two or three every night. A week before admission the abscess over the left ear had been opened and matter had come away. For four days the patient had been much worse, the vomiting and shivering more frequent and violent; she had begun to squint, and said that she was going blind. The hearing power, never good, had disappeared entirely.

On admission, the patient was obviously very ill and in great pain; she seemed in a stupid and half-dazed condition, and lay groaning and tossing about; her face was pale and pinched, the pupils were widely dilated, the tongue dry and thickly coated; her skin was hot and dry, the temperature was 102.8°, and the pulse 130. In consequence of her extreme deafness and half-unconscious state it was difficult to communicate with her, and there was thus some doubt as to whether there was slight facial paresis on the right side. The movements of the arms and legs appeared normal. There was paralytic convergent strabismus; the pupils were widely dilated, and hardly reacted at all to a bright light. Optic neuritis was present in each eye. The urine was normal.

On the left side pus was found in the external auditory meatus, the posterior and upper wall of which was swollen and sinking forwards. The membrana tympani could not be seen owing to swelling of the meatal walls, but there was little doubt that a perforation into the middle ear existed. A large baggy fluctuating swelling extended over the whole left parietal and squamous regions, and behind the mastoid

¹ Read before the Leeds and West Riding Medico-Chirurgical Society.

2 inches posteriorly to the meatus. The mastoid region itself appeared healthy, and was not tender on percussion. On the right side the meatus was full of pus, the membrana tympani was perforated, and there was an extremely tender elastic swelling the size of a split walnut behind the mastoid process, but here again the mastoid region itself was normal and not tender. There was no swelling nor tenderness in the neck or in the course of the internal jugular vein of either side. No evidence of septic pneumonia, bronchitis, or visceral disease was found.

The diagnosis of suppurative otitis media, with extension into the mastoid cells of each side, was made, and in addition, and of most immediate importance, septic thrombosis of one lateral sinus, but beyond the fact of the falling in of the posterior wall of the right meatus there were no symptoms indicating on which side the disease was more serious or which sinus was thrombosed.

The patient was anaesthetised and the head shaved. The extent of the swelling on the left side was then seen more clearly. An incision was made through its lowest part over the postero-inferior angle of the parietal bone, and pus and blood clot escaped. The floor of the cavity was composed of bare bone all over, yellowish-white in colour. The ordinary 2-inch curved incision, half an inch behind the attachment of the left auricle, was made straight down to the bone, and extended backwards in a curved direction to meet the first incision, and the flap was then turned upward. The bone over the mastoid region appeared healthy, no soft carious bone nor pus being present. The antrum was opened with chisel and mallet immediately behind the meatus in the suprameatal triangle described by Macewen, and found full of caseated material and pus. The bone removed by the chisel was densely hard, and the antrum lay deep, five-eighths of an inch from the surface. The cartilaginous meatus was cut through, the ear turned forwards, the posterior wall of the meatus chiselled away, the remains of the membrana tympani and the ossicles removed, and the middle ear and antrum cleaned out by washing and gentle scraping. The roof of the tympanum and antrum was dried and carefully inspected with the aid of the electric search light, and examined by touch with a bent probe, but no perforation into the cranial cavity was detected. The whole cavity was then washed out with carbolic lotion, dried, and plugged with cyanide gauze. Next the bone was chiselled away posteriorly to lay bare and examine the condition of the lateral sinus. An area three-eighths of an inch in diameter was exposed and found covered with pus, the opening in the bone was extended, and a larger part of the sinus exposed, the vein opened with a scalpel, and a considerable quantity of pus and breaking down clot removed. There was no bleeding. A small Volkmann's spoon was then passed up the vein in the direction of its channel, and clot gently scraped away until a sudden gush of blood showed the way was clear. The bleeding was allowed to continue for a moment to wash away loose bits of clot, and then the sinus was plugged with Horsley's antiseptic wax, which immediately arrested the hæmorrhage. Attention was then turned to the lower part of the sinus; this was scraped out, well cleansed, and filled with wax. The rest of the wound and bony cavity was plugged with cyanide gauze, and the skin flap stitched in place.

The patient was turned over, the abscess behind the right mastoid opened; it contained about 3 drachms of very offensive pus, and its floor was formed by bare bone. The bone over this mastoid process appeared like the other to be perfectly healthy, but on opening the antrum pus and granulation tissue were found filling the cavity. This was quickly cleaned out, the dressings applied, and the patient sent back to bed. She was much collapsed; ether and digitalis were injected subcutaneously, and brandy given by the rectum.

The next morning the patient was rather better, the temperature subnormal, the pulse 116. During the day she vomited once, but there was no return of the rigors. The following day, September 17th, she volunteered the statement that she felt much better and had no pain, but asked that she might not have her left arm pricked. It was then found that there was distinct weakness in this arm and hand, but no numbness or loss of sensation. The movement and sensation in the legs were normal. No further vomiting nor rigors occurred.

On September 19th the patient complained of some pain in the head, the temperature rose to 101°, and she vomited. Two days later a swelling appeared at the back of the neck in the middle line; this was opened and a quantity of foul smelling pus was evacuated. The cavity led down to the external occipital protuberance, which was felt to be bare. After this the patient steadily improved, the optic neuritis almost disappeared, and on February 10th, 1895, the vision had returned so that she could read J. 2. The hearing power, which had been *nil* in both ears, had returned on the right side, so that she could hear loud conversation; it had not altered on the left side. The convergent strabismus had almost gone, but the paresis in the left arm and hand remained.

One point of interest in the case was the presence of a superficial abscess on each side of the head considerably behind the mastoid region, and the independence of these abscesses on any immediately underlying bone disease. In fact, as stated above, not only the skin but the bone over each mastoid when laid bare appeared perfectly healthy. These abscesses evidently did not arise by direct extension of the disease in the antrum, through the bone, but probably in the same manner as pyæmic abscesses elsewhere, and it is most likely that the abscess in the neck occurring after the operation arose in a similar way.

I am indebted to Mr. Whitehead and Mr. Trumper for the careful notes they have taken of the case.

LAMINECTOMY FOR COMPLETE PARAPLEGIA PRODUCED BY ANGULAR CURVATURE OF THE SPINE.

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T. F., aged 12, was seen by me on March 24th, 1894. There was a history of his having been knocked down on the ice in February, 1891, and, about six or seven months later, it was observed he was growing crooked. A felt jacket had been worn for a time, but ultimately it had to be abandoned on account of the discomfort produced. The date when the boy became paralysed cannot be made out clearly, but the mother is quite sure that by July, 1893, the boy had completely lost the use of his legs, and this paralysis is said to have crept on gradually.

I found complete paralysis of motion and sensation in both lower limbs; he was quite insensitive to the touch of the fingers or the pricking of a pin, and these conditions extended to about the sixth intercostal space. The spinal column presented a distinct postero-lateral curvature in the upper dorsal region, the most prominent part of the curvature being at the fifth dorsal spine. The curvature seemed to take in, as nearly as could be made out, the fourth, fifth, and sixth dorsal vertebrae. The reflexes were all present, both superficial and deep. The patellar tendon reflex was much exaggerated and so was ankle clonus. There were no rectal or bladder symptoms, the functions of these organs being undisturbed.

All active disease in the spine had subsided, and this then appeared to me a suitable case in which to operate with a view to relieving the pressure on the cord, which undoubtedly was the cause of the boy's paralytic condition. Accordingly on April 4th, 1894, chloroform having been administered, I removed the arches of the fourth, fifth, and sixth dorsal vertebrae. The wound was kept strictly antiseptic, and washed out with boracic acid solution. A drainage tube was inserted in the depth of the wound, in contact with the cord; the muscles were brought together by a continuous catgut suture, and the superficial sutures consisted of the usual silk-worm gut.

On April 5th, the day after the operation, the temperature was 99°; only a little sanguineous discharge had escaped on to the dressings, and the drainage tube was removed. Sensation and voluntary movement were already returning, the patient was free from pain, and his whole general condition good.

The further progress of the case was uneventful. Suffice it to say that he went on uninterruptedly towards recovery, and