PUNCTURED FRACTURE OF THE SKULL; SYMPTOMS OF COMPRESSION FOR THIRTY-FOUR DAYS; OPERA- TION; RECOVERY.

By A. H. TUBBY, M.S.LOND., F.R.C.S.ENG.,

Assistant-Surgeon to Westminster Hospital, Surgeon to Out-Patients
Evelina Hospital for Sick Children, etc.

THE case now recorded is of considerable surgical interest on account of the serious nature of the injury, the depth to which a portion of bone had been forced by the blow, the suppuration extending over six weeks, the comparatively slight symptoms of compression and cerebral irritation, and the complete and rapid recovery after operation. The notes of the case are as follows:

On January 16th, 1894, Mr. P. J. De C., aged 43 years, was thrown from his horse, and alighted head foremost on a recently metalled road. He picked himself up, and although experiencing a certain amount of pain from wounds in his forehead and inconvenience from the accompanying hæmorrhage, was able to walk home; and at no time was there any giddiness nor unconsciousness. For the account of his condition from the date of the accident to February 19th, 1894, I am indebted to Dr. Hill, of Dursley, who kindly sent me the details. He saw the patient shortly after the accident, and found a lacerated wound on the right frontal eminence about an inch in length, extending down to bone, and bleeding copiously. In the middle line of the scalp, and at the anterior termination of the sagittal suture a second lacerated wound was seen. Here a distinct depression could be felt in the bone. The wound on the right frontal eminence healed up, but that on the vertex refused to do so. A small sinus discharging pus was left, and at the bottom of this a little loose bone could be felt. The patient was strongly advised by Dr. Hill to have the wound explored, but as he felt no serious inconvenience he decided to wait. Finding, however, that the discharge continued, he came to town. I saw him on February 19th, the thirty-fourth day after the accident.

The condition was then as follows: The pupils were widely dilated, and reacted badly to light: the pulse was 58, slow and full; the speech was deliberate and hesitating, the mind was clear, and the memory good. There was slight blurring of both optic discs. There was no paralysis anywhere. At the anterior extremity of the sagittal suture a discharging sinus, situated in the middle of some scar tissue, was seen. On pressure a few drops of pus oozed up, and from an inspection of the dressings I should think that about 1 drachm of pus was discharged in twenty-four hours. At the same time an oval depression in the bone could be felt. On probing the wound some small pieces of dead bone were encountered. The second wound, that on the forehead, was soundly healed. The temperature was normal. The patient was advised to be operated on at an early date.

On February 20th an incision was made through the scar tissue of the vertex wound, and three small portions of bone, lying close to the integuments, were removed. The edges of the aperture of the skull were then examined, and a small fracture of the inner table was found, the splintered portions of which were taken away. As the depression in the skull was an inch in its longest diameter, a considerable piece of bone must have been missing. Search was then made for this piece. The dura mater was not seen at this stage, but was separated from the bone by a mass of blood clot and granulation tissue. This was scooped out, and lying more than half an inch below the surface of the skull a considerable piece of dead bone was found. It was oval in shape, and measured seven-eighths by half an inch. The dead fragment comprised both inner and outer tables of the skull, and was apparently pressing between the cerebral hemispheres, pushing them apart. The dura mater was seen to be intact. The skull, however, must have been exceedingly thin, as the fragment was in no place more than one-eighth of an inch thick, while in parts it was almost paper-like in consistence. The wound was sutured, leaving a small aperture for drainage.

On February 21st the pulse had risen to 78 per minute, the

speech was no longer hesitating, the pupils no longer dilated, and they reacted readily to light; the temperature was normal. On the next day there was slight giddiness, which was relieved after giving a purgative. The wound subsequently healed rapidly, the optic discs became quite clear, and the patient went home well in all respects on March 9th, and has remained so since.

REMARKS.—The peculiar features of this case are the serious nature of the injury and the fact that it was attended by what seemed to be such apparently slight symptoms, but which were in themselves of serious import, the patient, I take it, being in danger of meningitis or intracranial abscess at any time; the depth to which the separated portion of bone was pushed—from half to three-quarters of an inch; the complete and rapid relief afforded by the operation. That the symptoms were not more pronounced was due to the position of the fracture, the bone pressing in between the hemispheres, and therefore not being so placed as to give rise to paralytic symptoms. In any case, the circulation in the superior longitudinal sinus must have been impeded, but no effects seem to have followed.

A CASE OF AURAL PYÆMIA WITHOUT SINUS THROMBOSIS TREATED BY LIGATURE OF THE INTERNAL JUGULAR VEIN AND PLUGGING OF THE LATERAL SINUS.

By EDWARD DEANESLY, M.D., B.Sc.LOND., F.R.C.S.ENG.,
Honorary Casualty Surgeon Wolverhampton General Hospital.

THE subject of aural pyæmia, though much has been written on it during the last few years, is still of great surgical interest, and still contains several unsettled problems. The treatment of this condition when, as in the present case, unaccompanied by thrombosis of the lateral sinus, has not yet received as much attention as those in which the indications for interference are more obvious and clear. The fact that my own case was not successful in its ultimate result is, I think, an additional excuse for its publication, since there is no more useful guide to success than the records of previous failures, accompanied by an account of the conditions which determined the result. I record the following case in hope that it may prove useful in that way.

A female child, aged 4 years, eleven days after the onset of a severe attack of scarlet fever, developed on June 11th, 1894, double otorrhœa, which was both preceded and followed by much pain. On July 25th an abscess appeared over the left mastoid, from which an incision two days later evacuated several drachms of foetid pus. At this time pain had ceased, but the child looked thin and ill, and had a yellow earthy complexion. On August 1st she was seized with a sudden rigor, with much lividity. The temperature rose to 103°, and she vomited several times. The following day severe rigors occurred at 5.30 A.M. and 6.30 P.M. Both were followed by repeated vomiting. On August 3rd the temperature fluctuated between 98° and 101°, but there was no rigor. On August 4th, at 4 A.M., a most severe rigor occurred, during which the temperature rose to 106°. This was followed by much collapse and vomiting. Although there were no local indications of sinus phlebitis or thrombosis the general symptoms pointed so clearly to aural pyæmia (venous absorption) that I decided to ligature the internal jugular vein on the side which the mastoid abscess indicated as probably the seat of the most severe ear mischief. Accordingly at 3.45 P.M., August 4th, I ligatured the vein on the left side just above the omohyoid muscle with fine silk in two places, and divided it between the ligatures. The vein showed no sign of inflammation or thrombosis. The wound having been sutured without drainage and protected from infection as completely as possible, the left mastoid antrum was next opened by removing a sequestrum which lay immediately over it in the suprasternal triangle. The removal of a thin layer of bone with the gouge then exposed the sigmoid sinus, which being rendered tense by the previous ligature of the jugular vein was easily recognised. It showed no sign of inflammation, and on being incised bled profusely. This was checked by a pad of gauze placed over but not actually entering the sinus. The operation was borne well. The following morning, August 5th, the aspect was much improved and the temperature normal. At 12 P.M. the temperature rose to 100°, with a slight rigor. The evening temperature was 101°.

August 6th. The patient was not so well. At noon chloroform was given, and the head wound dressed. On removing the plug, free hæmorrhage occurred from the lateral sinus. A narrow piece of carbolic gauze was therefore stuffed downwards right into the sinus in order to induce coagulation.

August 7th. She was very drowsy all day. The evening temperature was 105°, and there was slight puffiness about both eyes. The neck wound appeared to be healing without reaction. No rigor or vomiting had occurred since August 5th.

August 9th. On removing the plug from the sinus, a very foetid brown

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

By H. SECKER WALKER, F.R.C.S.,

Assistant Ophthalmic and Aural Surgeon to the General Infirmary at Leeds; Lecturer on Ophthalmology and Otology in the Yorkshire College, Victoria University.

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.