scalp scar of the incision made for exploration of the temporo-sphenoidal lobe. This scar pulsates owing to the deficiency of the cranium beneath it at the point where the bone was removed over the middle fossa.

At this date, five weeks after the second drainage operation, drainage was discontinued through the anterior channel, which within the following two weeks ceased to open into the abscess cavity. The scalp suture was also removed from the posterior tube, which was subsequently shortened slightly from time to time as the contraction and filling up of the cavity gradually expelled it.

During the following weeks, though the patient was in every way well in general health and the tube practically free from discharge, it was not entirely withdrawn, as the middle ear constantly contained small quantities of pus, which apparently escaped from the internal ear. It was not, therefore, considered advisable to allow the abscess drainage channel to close.

On September 23rd a bony sequestrum was discharged from the internal into the middle ear, and removed by forceps through the mastoid cavity. The sequestrum was of irregular shape and of the size of a large pea (one-third inch by one-quarter inch). The tube was at this date withdrawn, and the posterior wound permitted to close, which it did in a few days.

Fig. 3.—Photograph of patient four months after drainage of the cerebellar abscess. At this date the facial paralysis, which had been present for four and a-half months, had disappeared.

Fig. 3 represents the patient at this stage. The facial paralysis had quite disappeared. He walked without giddiness, read and wrote, and had not a symptom of his former trouble, except that there still existed some slight discharge from his middle (internal?) ear. This Dr. Barr treated.

On November 4th, 1898, the patient was shown to the Glasgow Medico-Chirurgical Society. At that date he had returned to his occupation, having no trace of his late illness except that that his old deafness remained, though the ear discharge had ceased.

Instances of recovery from cerebellar abscess are not of frequent occurrence. In 1896 Dr. Acland and Mr. Ballance published in the *St. Thomas's Hospital Reports* a paper on cerebellar abscess containing a full account of the literature of the subject up to that date. They state (1) that every case of cerebellar abscess not operated on has proved fatal; (2) that, up to the date of the paper, there had been published

10 (possibly 11) cases of recovery after operation, and 16 cases of death after operation. "These numbers," however, the authors remark, "do not accurately represent the percentage of success after operation, since it is within our knowledge that many fatal cases have not been published."

Experience of such cases goes to prove that: (1) Early operative interference in the way of discovering and subsequently draining the cavity offers the only chance of recovery in cases of intracranial pyogenic lesions; (2) that the results in such cases of operative interference have been much more favourable in temporo-sphenoidal than in cerebellar abscess; (3) that the cause of death in cerebellar abscess is, in a large majority of the cases, dropsical distension of the lateral ventricles (with oedema of the surrounding brain tissue). This ventricular dropsy appears to be the result of obstruction of the veins of Galen, produced by thrombosis originating in their lumina, or extending thence either from the superior cerebellar veins or from the straight sinus.

At the present date, two years and a half after operation, the patient remains well. For twenty-six months he has followed his occupation, without the slightest return of any of his symptoms. He is still, however, deaf in the affected ear, and pulsation can be detected in the trephine area over the temporo-sphenoidal lobe.

TREPHINING IN INTRACRANIAL SUPPURATION THE RESULT OF FRACTURE.

By D. A. McCURDY, F.R.C.S.,
Londonderry.

The following report refers to a case of intracranial abscess resulting from a fracture of the frontal bone caused by a blow with an iron bar.

History.—A soldier, aged 24, suffering from a lacerated wound in the forehead, walked into a military hospital some eleven hours after the infliction of the injury. Although carefully looked for by the military surgeon when the patient presented himself for treatment, no fracture could be discovered; the wound was, however, antiseptically dressed, and the man was detained in hospital. An attempt to obtain union by first intention failed, and although the part was carefully attended to each day, pus persisted in flowing from the wound. On the eighteenth day after the injury the patient was seized with an epileptiform fit that lasted for an hour and a half, at the end of which time full consciousness returned. While suffering from this attack there was right ptosis, which, however, soon passed off.

Condition when First Seen.—Some hours after the seizure, when I first saw the patient, his pulse was 64, and his temperature 101°. His face was not flushed, his pupils were equal in size, and there was no paralysis. He was quite conscious, and said he had no pain in his head. The wound at this time was carefully syringed with carbolic lotion, fresh dressings were applied, and a dose of calomel given, which acted well. A good night was passed, and next forenoon the temperature and pulse-rate were as on the previous day. The patient presented a normal appearance, and said he had no complaint to make. On the third day after the epileptiform attack I found the patient perfectly conscious, but learned that he had had another severe seizure that morning. The left hand grip was now weaker than normal, and the right pupil was dilated. The temperature was 101°, and the pulse 64°.

Operation.—A diagnosis of an intracranial abscess was now made, and I recommended trephining over the seat of the injury. Colonel Martin, R.A.M.C., agreeing to this course, and chloroform having been administered, I enlarged the wound in the forehead, and on exposing the frontal bone, already denuded of pericranium over a considerable area, I discovered an oval fracture on the right side, about two inches above the orbital margin. The long diameter of the fracture measured a little over 1 inch, while the short diameter was about half that length. The fracture proved to be of the outer table only; but a linear fracture of the inner table, corresponding to the long diameter of that of the outer table, was subsequently discovered. There was no displacement on either side of the bone. On removing the bony disc, about two drachms of thick creamy pus immediately escaped. The pus seemed to have collected between the bone and the dura mater, the latter having a dark, unhealthy appearance. As, however, the pulsations of the brain were quite visible, I refrained from opening the dura mater. Warm carbolic lotion was freely used to cleanse the wound and the exposed membrane. The parts were then dusted with iodoform, and the lips of the wound loosely brought together by a few silk sutures. The patient quickly regained consciousness after the dressings were applied.

Progress.—On the day after this operation the patient said he felt well, having had a good night. The pupils were normal, and the left hand had recovered its power. On examining the wound on the following day a considerable quantity of pus was found to have exuded. The part was syringed with a 2 per cent. solution of carbolic acid, and then dusted with a mixed powder containing boric acid and iodoform. On the third day after the operation the temperature was 99.5°, and the pulse 76. Pus was still being discharged from the wound, which was cleansed as before with carbolic lotion, pure iodoform being used as a dusting powder. The patient seemed weak and drowsy on the fourth day. He was perspiring about the face, and complained of his head being painful. All noises, and even ordinary sounds, seemed to irritate him. A considerable

quantity of thick pus was found on removing the dressings. The temperature was 99.4° , and the pulse 58. After a restless night, and at 8 o'clock on the morning of the fifth day after trephining, the patient became unconscious. His face was flushed, and his breathing stertorous. The right pupil was dilated, but there was no sign of paralysis on either side of the body. On removing the dressings there was not so much pus present as usual. Having carefully cleansed the wound, I cut the sutures and exposed the trephine opening. The latter was quite filled with dura mater, whose appearance was still dark and unhealthy. Some blood clot was removed after incising the dura mater, but no pus was found; and although the brain cortex looked healthy, no pulsations were visible. From underneath the edges of the trephine opening a few drops of pus subsequently escaped. When these were washed away I punctured in several directions the frontal lobe of the brain, but with a negative result. There being no signs or symptoms present to warrant trephining in any other situation, I did not feel justified in doing so, and having thoroughly cleansed the parts with strong carbolic lotion, I brought the edges of the wound loosely together, and applied the dressings. Two drops of croton oil were placed on the patient's tongue without however producing the desired effect. The patient continued unconscious, and died at 6 P.M. on the same day, ten hours after the coma had set in.

Necropsy.—At the necropsy no pus was found in the wound or on the dressings, although the latter were on for over six hours before death, neither was there any sign of suppuration underneath the scalp. On removing the calvaria the meningeal vessels were found much distended, but except in the neighbourhood of the trephine opening, where it seemed bruised and congested, the dura mater presented a normal appearance. On removing this membrane from the left hemisphere nothing abnormal was seen; but on turning down the membrane on the right side quite a large quantity of thick, creamy pus escaped. This seemed to have collected in the neighbourhood of the horizontal limb of the Sylvian fissure, and involved the lower part of the parietal and upper part of the temporo-sphenoidal lobes; the cortex in these localities presenting an eroded appearance. The interior of the brain was healthy, and no other fracture of the skull was discovered.

There could be no doubt, therefore, that pressure caused by the collection of pus in the region indicated was the primary cause of death; and in the light of the *post-mortem* examination it was easy to see what might have been done by a further endeavour to save the patient's life. But why during life the pus in the subdural space did not travel freely to the trephine opening where it could find an exit would be difficult to say. After the trephining operation a larger quantity of pus saturated the dressings each day than could have been formed in the neighbourhood of the scalp wound. Some of this must therefore have come from inside the dura mater when the patient reposed on either side of his body; but when lying on his back, in which position he continued during the last twelve hours of life, gravity apparently prevented the pus finding an outlet by that channel. If this be correct, it follows that had I placed the patient in the prone position after reopening the wound and incising the dura mater, pus would have flowed through the trephine hole at least in sufficient quantity to indicate the direction in which another opening might have been made for its more speedy and complete evacuation. It seems therefore advisable to vary the position of the patient while searching for pus inside the skull.

A REPORT ON TEN CASES OF POISONING BY ARSENETTED HYDROGEN.

By J. S. CLAYTON, M.D.,

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This investigation into the circumstances attending ten cases of acute poisoning by arsenetted hydrogen, which occurred at a chemical works in this neighbourhood in August last, was made at the request of the Factory Department of the Home Office for further detailed information than was contained in the usual notification of such cases.

History of the Accident.

The process in which the men were engaged was the manufacture of zinc chloride from crude zinc oxide and hydrochloric acid. The zinc oxide was a waste material obtained from galvanising iron, and was, in fact, a galvaniser's refuse. The HCl was made on the premises, and admittedly contained arsenic. Unfortunately the firm made no quantitative analysis of these crude materials, but their chemist informed me that a sort of examination was made of both, as is their usual custom, sufficient to show them that less than 0.1 per cent. of As was found in the HCl, and much less than that in the Zn, so little, in fact, as to make the quantity impossible to determine. They also stated that so far as they them-

selves knew no other case of AsH_3 poisoning had occurred during the twenty years that this $ZnCl$ process had been going on. That other cases have from time to time occurred is however quite certain, very decided information on this point being obtainable from the medical practitioners in the district, though of a less intense character and only in isolated cases.

There is a vat about 5 feet square at one end of the platform, 6 yards by 4 yards, raised about 4 feet from the ground; from this platform and at the opposite end, and 5 yards from the vat, is a gangway running to the ground. The platform and vat are in the open air, as is also the ground to which the gangway runs, with this exception, that over the ground part, and about 15 feet above, is a sloping roof about 3 feet wide from the wall of the building outside which this process is conducted, for the purpose of affording some shelter from rain to the men beneath. This part, which is a sort of well, is therefore open to the air, with the exception of having the platform in front and the ledge over part of it above. The idea is that any noxious fumes which may be generated may thereby be readily carried away. There is a doorway leading from this well into the building through which material is brought to the vat, and near by, about 10 to 15 yards distant and inside the building, is a furnace. The hydrochloric acid runs direct from a cistern in the adjacent building into the vat by means of a trough. The zinc oxide is emptied from bags into the cistern by men on the spot. These bags are brought from the ground of the well below and up the gangway to the vat by other men.

On this occasion it appears that the men, for some reason, were eager to get through a certain amount of work by noon, and two or three extra hands were taken on. The vat was kept well going, and more fumes than usual may have been evolved. The day was warm and unusually sultry. The fumes could not get away, and as the crude zinc oxide probably had mixed with it a small quantity of zinc carbonate, from which Co_2 would be evolved, the tendency of the gas would be downward, AsH_3 itself being heavier than air. In addition to this tendency, there would undoubtedly be the powerful indraught exerted by the furnace through the open door. Instead of this free access to the air being a security on this occasion, it constituted a danger. As a matter of fact, the men working nearest to the vat on the platform, and furthest from the well, suffered least, those down below in the well the most. Of those on the platform there were three. One was severely poisoned, one slightly, and the third escaped entirely.

With respect to the remainder, four men were engaged shovelling zinc oxide from a cart on to the ground area, and were at no time within 10 yards of the vat. All of these suffered more or less severely, and three others were occupied in loading barrows from this and conveying it up the gangway to the vicinity of the vat. These also were poisoned severely, one with a fatal termination on the seventh day. The obvious deduction from this incident is that of Dr. Dixon Mann:

It ought to be a standing rule at all works where any operations are performed in which hydrogen is largely used from crude materials, that the processes should be carried out in a closed vat, furnished with a sufficiently wide earthenware tube, so as to conduct the gases evolved directly into the tall chimney of the works.

Hitherto the recorded cases of arsenetted hydrogen poisoning have been comparatively few in number. In a very complete monograph on the subject by Drs. Dixon Mann and Gray Clegg a list of 49 cases is recorded which the authors believe includes all cases published up to that time. I am informed by Dr. Legge that the only cases reported to the Home Office since then, and the only cases of which I have obtained information as occurring in this country have been two fatal cases and one non-fatal case which occurred at a Weldon chlorine still at Irvine, Ayrshire, and one at a zinc chloride works in Blackburn, these together with the 10 cases here recorded would bring the total to 63.

SYMPTOMS.

The symptoms in the 10 cases here referred to were characteristic throughout, with the exception of one man who appeared to have absorbed a very small quantity of the gas, and who was correspondingly slightly affected. It is only necessary to quote one case as typical of the series, that of the foreman, who was engaged in emptying bags into the vat,