CLINICAL LECTURE ON CASES OF INJURY TO THE HEAD.

Delivered in University College Hospital.

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GENTLEMEN,—During the past month, there have been three cases of head-injury in my wards, which you have had the opportunity of watching to their terminations. Two of these patients made good recoveries, but the third died; and the *post mortem* examination yielded the specimen of fractured base of the skull now before you. The first case was that of a cabman, who was in the first bed on the right hand in No. 1 Ward at the beginning of the session, having been admitted on September 23rd, under the following circumstances. The night before, his cab, a four-wheeler, was accidentally upset, and he was thrown off the box, being stunned for the moment, but quickly recovering himself, with a recollection of having fallen on his right side. He was able to assist in righting his vehicle, which he then took home; and, about midnight, he applied here for the treatment of his bruised ribs. At that time, the house-surgeon found nothing wrong with his head, and therefore dismissed him; but, when he appeared next day among the casualties, Mr. Collins noticed some recent ecchymosis beneath the conjunctiva of the eyeball, which had not been there before, and therefore, very properly, at once admitted him. When I saw him the following day, the man complained of headache, and his pulse intermitted, but the ecchymosis had not increased; and, after a few days' quiet in bed, the headache passed off, the blood began to be absorbed, and he was discharged on October 6th.

Now, here was a case which presented few symptoms, but one of them of possibly grave import—I mean the subconjunctival ecchymosis. The ordinary ecchymosis of the orbit from a blow—the familiar “black eye”—consists principally of blood effused beneath the skin, which may possibly extend to the palpebral conjunctiva, and even beneath the conjunctiva of the eyeball, though this last is rare. But, then, there is a distinct local injury, and the hæmorrhage occurs immediately after its infliction. In this case, on the contrary, the hæmorrhage did not appear for at least two hours after the fall (probably later still); and there was no bruising of the neighbouring parts. Hæmorrhage of this kind occurring beneath the ocular conjunctiva must always be viewed with anxiety; for it may depend upon some fracture of the orbit, or of the anterior fossa of the base of the skull, the blood finding its way forward along the sheath of the optic nerve. With no further development of symptoms to guide us, we may hope that the patient had no serious injury, and that the hæmorrhage arose from some capillary rupture of no consequence; but the second case I have to bring before you shows how cautious one must be in drawing conclusions in cases of head-injury.

The second patient was also a cabman, and was in No. 1 Ward. He, also, was thrown off his cab, breaking his collar-bone; and was admitted on September 16th, with bleeding from the left ear. Now, bleeding from the ear may or may not be a serious symptom, according to the amount of it. A blow on the ear may cause slight hæmorrhage by lacerating the lining membrane, or rupturing the membrana tympani; but when blood flows continuously from the ear, as in this patient, for twelve hours, the case is obviously a grave one. Where did the blood come from? Not from one of the large sinuses of the skull; because, if one of these were torn, the hæmorrhage would almost necessarily be fatal, as I have seen in a case of bad fracture; but from the small vessels which supply the temporal bone and the organ of hearing, and are derived partly from the internal, and partly from the external, carotid. No plugging could be of any avail to arrest such bleeding; and the treatment consisted simply in keeping the patient quiet, with a bladder of ice to his head. The hæmorrhage ceased, as I have said, at the end of twelve hours, and was not followed by the flow of any other fluid from the ear; but the patient remained deaf on that side. Feeling pretty certain that the temporal bone had been injured, we left the patient quiet, and on low diet; and, at the end of seven days, the diagnosis was continued in the following way. In the evening, the man complained of difficulty in closing his eye;

and, the next morning, the facial paralysis on the affected side was fully developed. I frequently called your attention to his condition when going round; and I hope you all studied his case, for facial palsy is easily misunderstood. You will remember that the left side of the face had a peculiar lifeless appearance, while the right side was slightly drawn. He was unable to close his eye, to whistle, or to blow out his cheeks, owing to the portio dura of the seventh pair, the motor nerve of the facial muscles, being paralysed. Clearly this paralysis was due to injury to the nerve itself, and not to any cerebral lesion; for we know that, in facial paralysis accompanying an ordinary paralytic stroke, and dependent upon brain-disease, the fibres supplying the orbicularis palpebrarum usually escape.

What, then, is the explanation of this occurrence? It is that, at the time of the accident, the temporal bone was fractured, or, at least, fissured, in such a way as to permit the flow of blood into the tympanum, from which it flowed through the ruptured membrana tympani. The fracture was not sufficiently severe to give exit to any cerebro-spinal fluid, or to lead to inflammation of the meninges of the brain; but it undoubtedly passed close to one, or probably both, branches of the seventh pair. When, at the end of seven days, the lymph poured out for the repair of the bone began to be organised, it caused temporary pressure upon the nerves, giving rise to the facial paralysis and part, probably, of the deafness; but, after a few days more, either some absorption took place, or the nerve became accustomed to the pressure, as nerves undoubtedly do; and the patient gradually recovered entire use of his facial muscles, though he still remains somewhat deaf. He was discharged on October 20th, and has been here occasionally since to have his clavicle seen to.

The third and fatal case was that of a boy, aged 10, who was admitted on October 28th, having shortly before fallen to the ground head foremost from a furniture truck on which he was playing. On admission at 8 P.M., the patient was pale and slightly collapsed; pulse 72, small and soft; respirations 20, regular; pupils dilated, equal, reacting readily to light. He answered questions when spoken to, and said he was deaf, which he had not been before. A slight bruise was felt two inches above the left eyebrow. He had been, and was, vomiting. He was left in the casualty-room for half an hour; and, at the end of that time, blood-stained serous fluid was noticed trickling from the left ear. He vomited again, and then this fluid was shot out from the ear in considerable quantity. He was at once admitted to Ward 5; and it was then noted that the tongue was protruded straight, that there was slight dropping of the left upper eyelid and left angle of the mouth, and that there were slight twitchings of the left arm and all the right side. By 3 A.M., an ounce of the clear fluid flowing from the ear was collected. This gave the reaction for sugar, with Fehling's solution, very distinctly, a red precipitate being thrown to the bottom of the test-tube, which you all had the opportunity of seeing. The fluid was alkaline in reaction, and showed a trace of albumen.

When I made my visit on the following day, you will remember that we found the boy lying in a quiet drowsy state, exceedingly deaf with both ears, but quite conscious when we succeeded in rousing him. The pupils were equal, and of natural size, acting slowly under the stimulus of light. The tongue was clean and moist, and was put out straight. There was no evidence of paralysis, and no twitching at this time. The pulse was small and rather hard—75 per minute. The boy was unable to pass his urine, and it was drawn off with a catheter. The bruise on the forehead was distinctly visible, but no line of fracture could be detected. The clear fluid continued to flow from the left ear in considerable quantity.

Now, there could be no doubt in one's mind that this boy had sustained a most severe and probably fatal injury; since the symptoms I have detailed, and particularly the last, pointed unequivocally to fracture of the base of the skull, involving the left temporal bone. But there was more than this. The patient, who had heard perfectly well before, was now stone deaf; and, although no fluid poured from the right ear, yet this fact pointed to injury of that side, probably from extension of the line of fracture across the middle line of the skull. Under these circumstances, there was very little prospect of the patient's survival, the great risk being the occurrence of meningitis and suppuration within the cranium. With the object of combating this, I ordered one grain of calomel every four hours, and had the boy's head shaved and kept cool. You will find a divergence of opinion among surgeons as to the propriety of administering calomel in these cases of head-injury; but I have seen so many of them die without calomel, whilst I have seen three or four undoubted cases of fracture of the base recover under its administration, that I should not feel justified in omitting it; and I am glad to have such an eminent authority as Mr. Jonathan Hutchinson on my side. To do any good, however

the calomel must be pushed so as to affect the system rapidly; and I would remind you that, in young children, the best evidence we have of the constitutional effect of mercury is the passing of green motions resembling chopped spinach.

The patient was very restless during the following night; and the next day (30th) he was quite conscious, but perfectly deaf. The fluid still flowed from the ear. An ice-bag was kept to the head, and the calomel continued. At midnight, the boy was noticed to be little less conscious than before. At 3 A.M., the house-surgeon found him partially comatose; he gave a short sharp cry, and appeared to be in pain. At this time, the pupils were normal, and there was no squinting. At 10 A.M., the temperature was 100.2 deg., and pulse 132. He continued in much the same state till 3.15 P.M., when he suddenly became very livid, the respirations fell to four per minute, and he rapidly died.

At the *post mortem* examination, twenty-four hours after death, on the calvaria being exposed, you will remember that I called attention to there being no fissure or fracture opposite the bruise on the forehead, nor in any other part of the vault; and I shall have to refer to this point again. There was considerable congestion of the membranes of the brain, which was a little opaque. There was some recent lymph in the cavity of the arachnoid, especially on the left side and within the circle of Willis. On the brain being removed, the dura mater over the temporal bones was seen to be uninjured; but a clot of blood lay beneath the dura mater and the bone on the left side, and a smaller quantity in the same situation on the right. On stripping up the dura mater, we found a crack in the left temporal bone running from the upper border of the squamous portion, along the anterior surface of the petrous bone, as far as the foramen lacerum medium. Another small fissure extended from the jugular foramen of the left side to the petrosal sinus, lying a little external to the auditory meatus, and not joining the other. On the right side, there was a fissure at right angles to the axis of the petrous portion, passing from the jugular foramen through the internal auditory meatus. The membrana tympani was ruptured on the left, but entire on the right side. On the under surface of the brain were two spots of ecchymosis on the right side, corresponding to the position of the fissure. There was fluid in both lateral ventricles, but not in large quantity; otherwise the brain was healthy.

The *post mortem* examination thus confirmed the diagnosis made during life. The patient had a fracture of the base of the skull, involving both temporal bones, and hence the deafness; and he died of incipient meningitis, with effusion into the ventricles. This effusion was not sufficient to distend the ventricles; but, no doubt, occurred suddenly, and was sufficient to destroy life by pressing upon the great ganglia in the floor of the ventricle.

And now let me say a few words on the causation and pathology of this serious accident—a fracture of the base of the skull. The boy fell from no great height, but he fell on his head, and his head came into contact with the pavement. Now, according to the old and now exploded pathological doctrine, this would have been a good example of “fracture by *contre-coup*”; for one side of the skull was struck, and that opposite to it was broken; but we know now that fracture by *contre-coup* does not really exist, and that any fracture found must be the result of force applied to the bone more directly. When this boy fell, the weight of his trunk gave him the momentum which brought him violently to the ground; and when his skull was suddenly “brought up” against the paving stones, the whole of the impetus which his body had acquired came suddenly upon the base of the skull. No doubt he struck the left brow against the stones; and it was this that determined the direction of the fracture, which is in the line of force transmitted from the condyles (upon which the vertical column would impinge) towards the frontal bone; and had he fallen more directly upon the top of his head, the force would have been transmitted upwards from the condyles; and then the fracture would probably have been in the posterior, instead of in the middle fossa of the base of the skull. I must tell you that this view is not maintained by all surgeons; and notably Mr. Prescott Hewett, in his valuable article on Injuries of the Head, expresses the opinion that the fracture starts from the point of impact, and spreads to the base of the skull. In this case, however, I was most careful to examine the vault of the skull for any fissure, and none was discovered, the fracture through the squamous portion of the temporal bone being completely covered in by the temporal muscle and fascia, and there being no evidence of a blow at this point. Mr. Hewett quotes some experiments of Dr. Aran in support of his view; and in so far that “the part of the vault which first struck the ground gave, as it were, the key to the fracture which would take place at the base”, I agree with him, but simply because the direction of the line-force transmitted from below is no doubt thus determined.

Then with regard to the flow of fluid from the ear: this was not

noticed at first; but, half an hour after the accident, it was seen by Mr. Collings, the house-surgeon, and at once decided the question of the admission of the patient. Fortunately, every child that falls on its head and is stunned for a time, does not break the base of its skull; but you must be careful not to give too confident an opinion as to the nature of the case directly after the accident, lest a symptom of such great gravity should develop a little later. And yet, let me say, although we all nowadays lay so much stress upon this flow of fluid from the ear, it is remarkable that the older surgeons, who must have seen it often enough, appear to have attached no importance to it. It is less than forty years since the symptom was recognised as denoting fracture of the base, although one or two cases of its occurrence had been put on record at a much earlier date. And even when it was recognised, surgeons were not agreed as to the source of the fluid. Now, there is but one fluid which is clear and alkaline, and contains a trace of albumen and some sugar; and this is the cerebro-spinal or sub-arachnoid fluid. You will remember that, on one occasion, when the patient vomited, the fluid is reported to have shot out of the ear—*i.e.*, that when, by the effort of vomiting, the brain became more congested, the fluid was driven out of the cavity of the skull; and Mr. Hilton narrates an experiment he made on a case of fracture of the base to prove the same fact, in which he temporarily produced congestion of the brain by closing the patient's nose and mouth, with the result of causing this fluid to shoot out. All authorities are, I think, agreed as to the nature of the fluid; but it is a little difficult to explain its escape. As Mr. Hewett tersely puts it, “the escape of the cerebro-spinal fluid implies a fracture cutting across the meatus internus, and communicating with the tympanum, a laceration of the tubular sheath of the cerebral membranes surrounding the seventh pair of nerves within this meatus, and a laceration of the membrana tympani”. Now, on the left side, we had a rupture of the membrana tympani, and a fracture involving the meatus internus and tympanum. I could not demonstrate to you that the tubular sheath of the seventh pair was ruptured; but we may conclude that this was the case; and there could be no doubt about the escape of the cerebro-spinal fluid. On the right side, there was no fracture into the meatus internus, but no rupture of the membrana tympani, and, therefore, no flow of fluid from the ear. There was a fracture into the tympanum; and this had, no doubt, broken the connection of ossicula across that cavity, and hence the deafness. It would have been interesting to have ascertained, had the gravity of the case been less, so as to justify the inquiry, whether the child could have appreciated the note of a tuning-fork or the sound of a watch applied to the bones of the head, since this would have shown that the auditory nerves themselves remained uninjured. His best chance of life, however, consisted in maintaining perfect quietude, and I did not like to have him disturbed.

CLINICAL LECTURE

ON

THE ADVANTAGES OF ETHER OVER CHLOROFORM.

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GENTLEMEN,—I purpose to offer you a brief comparison of the relative values of chloroform and ether as anæsthetics. It has very frequently been my duty during the last ten years, in hospital and in private practice, to induce anæsthesia for the performance of surgical operations. Until a year ago, I invariably used chloroform; during the last twelve months, I have always employed ether. I shall offer for your consideration some reasons why ether should be preferred to chloroform—reasons which have induced me to rely upon ether as the better anæsthetic.

Surgical anæsthesia was unknown in modern times until thirty-one years ago. I say in modern times, because there is good reason for believing that some means by which the painless performance of operations could be ensured were known to practitioners of the art of surgery long before the present century. In Middleton's comedy, *Women beware Women*, printed in 1657, the following passage occurs.

“I'll imitate the pities of old surgeons
To this lost limb; who, ere they shew their art,
Cast one asleep, then cut the diseased part.”

On December 11th, 1844, nitrous oxide gas was successfully used as an anæsthetic by Mr. H. Wells, of Hartford, Connecticut. (Townsend's *Manual of Dates*.) From this time, the use of anæsthetics has rapidly spread in surgery. Anæsthesia has become a want of the age; the