Lecture

ON

CRANIAL AND INTRACRANIAL INJURIES.

Delivered at the Royal College of Surgeons of England,

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LECTURE III.

MR. PRESIDENT AND GENTLEMEN,—The subject of Tension, to which my two former lectures were devoted, leads in no unnatural way up to the consideration of Cranial and Intracranial Injuries, for most, if not all, surgeons will be ready to admit that in such cases the evil effects of tension are notably manifested, and that operations undertaken with the object of evacuating either effused blood or inflammatory fluids pent up within a closed cavity such as the skull—that is, for the relief of tension—are of especial service. It is not my intention, however, to dwell at any length upon this aspect of the question, for I have thought it well to use my present opportunity to bring before you some general considerations on the subject of cranial injuries, which I have good reason to believe are neither sufficiently recognised nor generally taught,—and more particularly since these considerations have no unimportant influence on surgical treatment.

As a preliminary reflection, I would emphasise a point which the surgeon should ever bear in mind in all head injuries—viz., that the effects of a force applied to the skull are much influenced by its thickness, and that in this matter there is in cranial bones great diversity. Under these circumstances, a slight blow on a thin skull may bring about a fracture, and no general cerebral injury, since the vibrations originated by the force of impact are expended locally upon the part struck, and are not carried along the bony basal ridges so as to vibrate in the brain structure and bring about mischief. Whereas, whilst a severe external force may fail to cause a fracture of a thick skull, it may start such intense vibrations within the cranium as to cause bruising or laceration of the brain, either of its surface or of its substance, at a point remote from the seat of impact, and even at times produce laceration of the venous sinuses or of the middle meningeal artery. In the former case the injury on the face of it looks severe; whereas it may be comparatively trivial, since there is no cerebral injury. In the latter instance the injury may appear slight, although in reality it is one which bodes death from cerebral mischief.

To say that injuries of the head should always be estimated *primarily* with reference to the amount of damage the cranial contents have sustained, and *secondarily* with reference to the risk of their becoming involved, is to say what all sound surgeons of experience believe and make the basis of their treatment. And yet students are taught to think that scalp wounds, fractures of the skull, hæmorrhage beneath the bone, concussion and compression of the brain, and inflammation of the brain are separate and independent affections, with diagnostic symptoms which can be tabulated. The surgeon, however, who goes to the post-mortem room for information, knows too well that in every case of cranial injury of any importance there are certain brain changes common to most, if not all, which should be fully recognised and taken into account in its diagnosis, prognosis, or treatment; and that, should either a fracture, with or without depressed bone or intracranial hæmorrhage, coexist in the same case, such a condition had better be regarded as a complication of the common factor rather than as one which stands alone. For example, a man falls or receives a blow upon the head, and is for a time “stunned”—that is, rendered more or less senseless from paralysis of brain function; he is said to be suffering from “concussion of the brain,” whatever that term may mean. Another man, as a result of the same kind of accident, receives in addition to the “stunning” a scalp wound, with a fissure either in the vertex or base of his cranium; and he is described as one who is suffering from a

compound fracture of the skull, either of the vertex, base, or of both. A third man comes under observation in the same state of so-called concussion, but with a depressed fracture of bone, complicated or not with a scalp wound, and as a result of this depression there may or may not be other symptoms, or those present may be intensified. Under either circumstance, however, his case is described as one of depressed fracture of the skull, giving rise to compression of the brain. Yet in all these different classes of cases there is one common injury, one common source of danger, present or remote—viz., the condition of the brain which is associated with the injury, and which has been brought about by the “stunning” force. If the general cerebral injury be trivial, the local complication of a scalp wound, or even of a fissured or depressed fracture, is, although serious, comparatively unimportant; if it be of a grave nature, the local complication must, however great, sink into insignificance.

What, then, it may be asked, is the condition of a brain in a state of so-called concussion? Let us inquire. Concussion of the brain means, in a physiological sense, a sudden and more or less complete arrest of the brain's mental and physical functions, brought about by external violence. The brain in its bony case has been made to vibrate more or less roughly either by some general shake of the whole frame, or by some local violence applied directly or conveyed indirectly to the cranium as a localised or diffused force, the effects of this force upon the brain being of necessity proportional to its concentration and intensity, and in a degree to the age and healthiness of the brain structure and the thickness of the cranial wall. Thus, a concentrated blow with a blunt or edged instrument, probably, and in a thin skull certainly, spends its force in producing a local cranial or cerebral injury; whereas, any force of a diffused nature, directly or indirectly applied, and whether causing a fracture of the cranium or not, more likely brings about some structural change in the cerebral tissue, remote from, rather than at, the seat of impact. And should the brain or its vessels, in either case, have undergone senile or any morbid change, it is more prone to suffer seriously from such external violence than a healthy organ. In every case, therefore, of injury to the head, the brain is made to vibrate more or less forcibly; when the vibrations are feeble, the injury to the brain structure resulting therefrom is but slight; when they are severe, the mischief may be great. The complication of a fissure or fracture of the skull does not of itself, of necessity, tend to aggravate the cerebral mischief; although its presence may be regarded as a measure of the force which has brought it about. In all cases of cranial injury, therefore, the conclusion is clear that the cerebral mischief is the common factor, and the one important point to be taken into account.

This conclusion consequently leads to the important question, What are the changes found in the brain after so-called concussion of its substance, or rather shaking of its structure? What are the structural changes, if any, which can be made out on the post-mortem table? For, of course, an answer to these questions can only be given from the observation of cases which have proved fatal, either directly from the injury, or at some remote period after the injury from other causes. Happily, the answer to this question is neither difficult nor uncertain. For I may say that at Guy's Hospital for at least a quarter of a century there was no case of head injury examined—and such includes every case—in which there was not some coarse brain lesion found, readily visible to the naked eye; in which there was not some contusion of the brain surface, laceration of the brain either upon the surface or within its substance; or more or less hæmorrhage upon or into the brain. In fact, concussion, in a pathological sense, has been, in my experience, synonymous with contusion or laceration of the brain. Other surgeons have expressed the same opinion from this chair. Sir Prescott Hewett, thirty years ago, said: “In every case in which I have seen death occur shortly after, and in consequence of, an injury to the head, I have invariably found ample evidence of the damage done to the cranial contents.” Mr. Hilton, who followed him, wrote: “We ought to consider a brain which has been subjected to concussion as a bruised brain.” And Mr. Le Gros Clark, who lectured later, stated: “I have never made or witnessed a post-mortem after speedy death from a blow on the head where there was not palpable

physical lesion of the brain." Neudorfer, of the Austrian army, declares that he has never seen concussion, as so-called, since in all cases he has examined cerebral injury was found to exist. And Fano, a celebrated French surgeon, has also come to the conclusion "that the symptoms generally attributed to concussion are due, not to the concussion itself, but to contusion of the brain or to extravasation of blood." In fact, all authorities now agree that, when death follows a severe shaking or concussion of the brain, contusion, bruising, or laceration of the brain is invariably present, and that when this is not found, the death is probably to be ascribed to some other than a cerebral cause; and I shall be able, later on, to show that when death does not take place as an early result of the damage, and the patient either dies of some other affection or of some remote consequence of the injury, the same evidence of cerebral contusion is generally present. When extravasation of blood upon or into the substance of the brain follows "concussion," or rather vibrating injury, it is to be explained in the same way—that is, by some injury done to the vessels of the brain itself, or to the venous sinuses within its membranes. When due to the bruising of the brain itself, the seat of injury is probably found on the side of the brain opposite to that of the cranium which received the blow; the bruising being brought about by what is rightly termed "contrecoup." A fall or blow upon the occiput is, as a rule, followed by some bruising of the anterior cerebral lobes; one upon the frontal region, by a bruising of the posterior parts of the brain; whilst lateral or vertical blows are felt more by the middle lobes. In severe vertical blows the base of the brain itself is bruised. The amount of extravasated blood depends upon the degree of force applied and the healthiness of the vessels in the injured part, diseased vessels easily giving way under a vibrating force to which the healthy would not yield. When the extravasation of blood is upon the surface of the brain, it is either within the cavity of the arachnoid or the meshes of the pia mater; and under each condition the blood gravitates to the base. When the extravasation of blood takes place into the structure of the brain, it may be found in any part of the cerebrum, cerebellum, pons Varolii, or even in the ventricles, the extravasation rarely showing itself in the form of one large clot, but commonly in small and numerous spots of extravasation, which cannot be wiped away, as if from small vessels.

Thus I found in one case of so-called concussion, in which the fatal result took place sixty hours after the injury, from changes brought about by the severe shaking of the brain, unassociated with fracture, that the brain was bruised all over, and blood was effused at the injured spots; the fluid in the ventricles was blood-stained, and the ventricles themselves ecchymosed.

In another case of death from "concussion," without fracture, the result of a fall, in a man aged thirty-one, on the fifteenth day after the injury, in whom convulsions and coma supervened, a layer of blood was found universally diffused over both hemispheres, dipping between the convolutions, and passing downwards towards the base. The clot, which was shreddy and of a dull reddish-black colour, had evidently been effused for some days. The surface of the brain beneath the seat of injury was softened; and at the base, where it had been damaged by contrecoup, similar changes had taken place. The vessels were healthy.

In a third case, where death followed from "concussion," and the vessels were diseased, multiple extravasations were detected after death throughout the substance of the brain.

A fourth case was that of a man (C. K.—) aged sixty-five, who came under my care with a scalp wound over the left half of the occipital bone and noisy delirium, having just previously fallen out of a truck on to his head. He had no paralysis or special head symptoms. The pupils were natural; the pulse was 70, and the temperature 99° 2'. He became rational in twenty-four hours, but only remained so for a day, when noisy delirium returned, with refusal to take food. This condition lasted for fourteen days, when he sank, although food was regularly and carefully given by the œsophageal tube. After his death on the sixteenth day from the fall, the anterior lobes of the brain, with the fore parts of the middle lobes, were found much bruised and covered with extravasated blood.

And in a fifth case—that of a man aged thirty-five, who came to Guy's on March 31st, and died on April 1st, 1882, about fifteen hours after the accident—blood was found

extravasated over the whole surface of the brain beneath the membranes, and the brain itself was much ecchymosed in fine points. The third and fourth ventricles were full of blood clot. There was laceration of the fornix and right optic thalamus, and no other lesion. The man had fallen on his head when jumping off a van, and given himself a scalp wound, exposing the bone, to the left of the occipital protuberance. He walked into Guy's, and complained only of headache and a feeling of sickness. He refused to stay in the hospital, and left. Having walked 200 yards, he vomited, and his friends gave him a "small soda." He then vomited again, and being unable to stand he was brought back to Guy's, where he was admitted insensible and comatose, and died, as already stated, fifteen hours after his fall.

When fissured fractures of the cranium complicate brain injuries, and these fractures are the result of some diffused force, the cerebral mischief is not likely to differ from that which has been just described, although, as the force to produce a fracture may presumably be greater than that which fails to do so, the intracranial injuries may be greater from the cerebral vibration. In some cases the brain itself may, in addition, be bruised at the seat of impact. On the other hand, where the force which produced the fracture is concentrated or the brain-case thin, there may be more of local brain injury at the seat of fracture, and less of distant mischief from brain vibration. And with the fracture there may be certain special complications, such as depression of bone with or without compression of the brain, injury to the dura mater, membranes, or brain from the fractured bone or external force, and extravasation of blood between the dura mater and the bone from rupture of the middle meningeal artery or some venous sinus. But all these are complications of, and additions to, the general injury. It must not be forgotten, however, that in exceptional cases a fracture of the skull may take place from a concentrated local violence without producing any cerebral disturbance, particularly over the frontal region.

To prove still more conclusively that "concussion" of the brain means bruising or laceration of the brain, with more or less hæmorrhage, I propose to bring before you the particulars of some cases which have been examined at Guy's Hospital after death, at more or less remote periods after the receipt of the head injury; and which died from either an independent affection or some remote results of the injury. Such cases are not numerous, but they are valuable, at any rate, for my present purpose. I trust I shall not, therefore, prove wearisome in reading brief abstracts of some of them.

CASE 1. *Cerebral injury; marked evidence of old bruising of the brain found.*—A powerful middle-aged man was found by a policeman in the Borough Market sitting down in a fainting condition. The policeman gave the patient some brandy-and-water, and brought him to Guy's, where he soon became comatose and died. One of his friends said that he had received an injury to his head some weeks (?) previously. After death no external signs of injury could be made out, and there was no fracture of the skull. The anterior and middle lobes of the left hemisphere of the brain were adherent to the base of the skull. The base of the anterior lobe showed brown discolouration from old bruising, and the middle lobe was so firmly adherent to the bone that it tore away. "These changes," wrote Moxon, who made the examination, "could not have been less than several weeks old, probably at least three months." There was a large effusion of recent blood clot (two ounces) over the right side of the brain. There was no blood in the brain, and no lesion of its membranes. The viscera were healthy.

CASE 2. *Cerebral injury complicated with fractured base of cranium thirty-eight days before death; bruising of the brain.*—David E—, aged nineteen, came under my care on June 24th, 1874, having fallen off an omnibus on to his head. He was admitted into the hospital, partly unconscious, with profuse bleeding from his left ear, which lasted for two days, and was followed for another eight days by the escape of a clear fluid (cerebro-spinal). On the second day after the accident the facial nerve became paralysed. The man died on the thirty-eighth day from broncho-pneumonia, having lost all his brain symptoms, except the facial paralysis. On examination of the body, a fracture was found in the skull, across the petrous portion of the left temporal bone, from the turn of the lateral sinus groove behind into the middle fossa, laying open the tympanic cavity. There was no trace of repair in the fracture.

The olfactory bulb on the *left* side was gone, and the brain about it was bruised. The central parts of the brain were soft.

CASE 3. *Cerebral injury complicated with fracture of the base of the skull twelve weeks before death; evidence of bruised brain* (Preparation in Guy's Museum, 1084⁵⁵).—William B—, aged forty-six, came under the care of Dr. Hilton Fagge in 1873, with vomiting after food and pain over the pylorus, which proved to be due to abdominal cancer. He had been an epileptic for four years, and during that time had been growing darker. Five weeks before admission, after a fall on the head from a ladder, he became insensible for a brief period, and blood oozed from his *right* ear, mixed with some watery fluid, which continued to flow for two days. All head symptoms disappeared, although he occasionally lost himself during his illness. He died from abdominal cancer. After death, a fracture of the base of the skull, crossing the petrous portion of the right temporal bone, and running the whole length of the meatus auditorius externus, was found. The under surface of the two anterior lobes and of the points of the left middle lobe of the brain presented a tawny yellow discolouration, clearly the result of blood effusion at the time of the injury, and, as usual, it was more marked on the side opposite to that of the fracture. There was also a little superficial softening of the cineritious substance.

CASE 4. *Cerebral injury six weeks before death, followed by abscess*.—William D—, aged thirty, was admitted into Guy's with pleuro-pneumonia, in a condition which soon ended in death, in March, 1873. Six weeks before his admission a beam had fallen upon his head, hurting him, but not producing any marked head symptoms or any bleeding from the ears or nose. Indeed, he had not given up work, but continued as an engineer's labourer for four weeks—that is, up to two weeks before admission, when he felt ill, shivered, and had severe headache; he also soon lost his taste for sweet things. When admitted he had no paralysis, only headache and drowsiness. His temperature was normal. He had no convulsions. After death the brain was found, on removal of the skull-cap, to be flattened, so that it appeared to have no convolutions. Its surface was discoloured in parts from what proved to be abscesses. A large and rather old abscess had burst into the hinder part of the right lateral ventricle, filling it with pus.

CASE 5. *Cerebral injury complicated with fractured skull and spine, &c.; death ninety-one days later* (Preparation in Guy's Museum, 1084⁵²).—George G—, aged twenty-seven, came into Guy's Hospital, under the care of Mr. Forster, in July, 1882, having fallen or been thrown out of a third-floor window. He was conscious, and complained of pain in his back. He had a scalp wound over the occiput, and evidently a fracture of the occipital bone. His lower limbs were paralysed from a fractured spine. The patient died of pleurisy. At the necropsy a fissure was found in the right half of the occipital bone, which extended vertically across the root of the petrous portion of the right temporal bone towards the lesser wing of the sphenoid. In the posterior cerebellar fossa there were two offsets, one of which ran down to the foramen magnum. There were but feeble signs of repair in the fracture. The brain at the right anterior lobe was much bruised. There was blood between the bone and the dura mater, and on the inside of the dura mater there was much brown pigment. The eleventh dorsal vertebra was fractured.

CASE 6. *Cerebral injury six months before death, brought about by meningeal apoplexy; marked evidence of old cerebral injury*.—Patrick H—, aged forty-one, was admitted into Guy's Hospital, under Dr. Pavy, in March, 1874, in a comatose condition, and soon died. He had been drinking for some days before, and had had a fit. Six months before, or thereabouts, after a fall down some stone steps, he was brought into the accident ward with a bruise over the right mastoid process and discharge of blood from the right ear. He was partially insensible for ten days, and was stupid for some time after. His pulse ranged from 40 to 50. He left convalescent and returned to his work, at which he continued until he had the fit for which he was readmitted just before his death. At the necropsy no injury of the cerebral bones could be discovered. The dura mater over both sides of the brain presented on its inner surface a tawny red colour, apparently stained with old extravasated blood. That covering the left hemisphere was smooth, but that over the right was in part lined with adherent coagulum which in

some parts was of a brownish colour, in others black. Some of it was evidently old. This was part of a large mass of coagulum which lay between the dura mater and the brain, on this side flattening the brain. The surface of the brain was so discoloured from staining with blood that the amount of clot was difficult of determination. The brain had evidently been deeply bruised at the time of injury at the inferior surfaces of both anterior lobes and the summit of the right middle lobe, particularly towards the back of the lateral surface of the right hemisphere, where there was an irregular fissure, with much tawny discolouration of the tissue. The lateral ventricles were healthy. The large effusion of blood clearly came from the rupture of the vessels of the softened part, and was probably in part due to alcoholic stimulants.

CASE 7. *Cerebral injury thirteen months before death; marked evidence of brain injury*.—George L—, aged twenty-two, was admitted into Guy's Hospital under Dr. Habershon in February, 1871, in a semi-torpid condition, having been found by a policeman in a fit after a day or more of drunkenness. He could be roused with difficulty, and when roused moved all his limbs. He had right facial paralysis. His pulse was 44; the pupils were contracted. He gradually sank. He had had a severe injury of his head thirteen months previously, from which it was supposed he had recovered. After death no signs of injury of the cranial bones were discovered. The brain was flattened, and the anterior and middle lobes were adherent to the dura mater at the base, and the brain tore away when an attempt was made to remove it. The membranes of the brain at the base were very thick, and partly opaque white, partly of an ochre-yellow colour; this appearance was confined to the membranes. The aperture into the fourth from the third ventricle was closed by some recent lymph, and the brain bordering the channel was soft. The lateral ventricles were greatly dilated, the descending cornu on the left side projecting like a blister at the base of the brain. The left middle lobe was diffident.

CASE 8. *Cerebral injury two years before death from phthisis; marked evidence of bruised brain*.—Wm. C—, aged fifty, came into Guy's Hospital with phthisis, under the care of Dr. Moxon, in 1874, and died within a few days. He was a sailor, and had enjoyed good health up to two years previously, when he had a high fall, and was stunned and bled from his left ear. The next day hot fluid came from the ear. He was laid up for three weeks, and when he left his bed he was giddy for nearly one year. He returned to his work, although deaf in his left ear. Five weeks before his admission he "caught a cold and cough," and died of acute phthisis. At the post-mortem examination no clear indication of fracture of the petrous portion of the left temporal bone could be made out, although there was a slight transverse line across the bone. There was an old bruise of the anterior lobe of the brain on the left side and slightly of the base of the middle lobe. That on the anterior formed an irregular hollow the size of a shilling. The grey substance was quite destroyed, and microscopically was found to present hamatoidin crystals and compound granular masses.

CASE 9. *Cerebral injury complicated with fracture of the base of the skull on the right side eight years before admission, followed by fits, chronic hydrocephalus, spinal curvature, emphysema, and hydrothorax; marked evidence of old bruising of the brain*. (Preparation in Guy's Hospital Museum, 1084⁵⁶).—David W—, aged thirty, was healthy until eight years before admission, when he fell off a ladder and hurt his head. Since then he had not been able to do hard work, and his memory had failed him. Five years ago he had a fit, and others had followed. He was admitted under Dr. Wilks in 1876, in a fit, comatose, and passing urine under him; but he gradually recovered sensibility in a few days. In the hospital he had a fit, and both sides of his body were convulsed; when consciousness returned, it was found that the *left* side of his body had diminished sensation, but he said this had existed for eight years, and was gradually growing worse. He was fairly intelligent, and answered questions readily. His pulse was slow, 38 to 40. He died of bronchitis. At the necropsy the brain was found to be flaccid. At the base of the right middle fossa, and over the roof of the orbit there was a layer of brown pigment; also in the posterior fossa. The same pigment existed in patches over the base of the brain. There were fourteen ounces of fluid in the ventricles. The brain substance was healthy. The foramen magnum was

altered in shape, and narrowed antero-posteriorly, the transverse diameter being much larger than the other. There was fracture of the right side of the base of the skull. The spine was curved at the sixth dorsal vertebra towards the right. The cord was healthy. The lungs were emphysematous; fluid existed in the left chest.

CASE 10. *Cerebral injury complicated with fracture of the skull nine years before death; evidence of old as well as of recent brain injury.*—Michael L—, aged fifty, came under Mr. Cock's care on Dec. 29th, 1867, and died on Jan. 7th, 1868. He had fallen twenty feet on to the side of his head, and was admitted with a scalp wound and depressed fracture to the left of the vertex. He was unconscious on admission, but not paralysed, and was never clear enough to give a history of his accident. One of his friends stated that he had had an injury to his head nine years previously. After death the cranial bones were found to be thin. On the occipital base about the left part of the groove for the torcular Herophili were *fine* rough elevations, and here the dura mater was very adherent. About this part there was an old depressed irregular fracture of the bone, the bone being now united to the rest. Within the skull there was an elevation corresponding to the external depression, and its edges were bevelled off. There was no sign of any old external wound over the fracture, or of blood between the bone and dura mater; but on opening the latter about an ounce of liquid clotted blood was found effused over the left vertex, corresponding to the recent scalp wound. The right anterior lobe of the brain was adherent over the orbit, and the brain here was discoloured brownish yellow, as from old hæmatoma, this part corresponding to the spot of contrecoup from a blow on the left back of the head.

CASE 11. *Cerebral injury complicated with fracture; evidence of brain bruising, recent and old.*—Michael W—, aged fifty-three, came into Guy's Hospital, under Mr. Cock, in February, 1867, and died in two days. He was found in the street insensible, with a wound on the back of his head and bleeding from both ears, but chiefly the left. He died comatose. At the necropsy there was clear evidence of a heavy blow having been given over the right mastoid process, the bone at this part being fractured. There was no blood between the bone and dura mater at this part, but there were about two ounces between the dura mater and the brain. There were *recent* contusions on the anterior and middle cerebral lobes, and *old* yellow discolouration of both middle lobes. The right one was firmly adherent to the middle fossa outside the foramen ovale. Lining the dura mater of the right middle fossa of the base of the skull, there was a thin membrane, easily separable; and this was thickest where the brain was adherent. The right middle lobe was more deeply bruised than other parts, where it was fixed to the fossa.

CASE 12. *Compound fracture of the cranium, with marked brain symptoms, occurring three years and a quarter previously; necrosis of the inner table of the skull; removal of the bone by trephining; death from phthisis; evidence of bruised brain and extravasation of blood.*—Conrad H—, aged forty-five, came under my care in January, 1879, with a discharging sinus on the right side of the occipital protuberance, communicating with the interior of the cranium, which had been the result of a compound fracture of the skull he had sustained three and a quarter years previously. The injury was brought about by a blow from a large stone, which stunned him, and he remained unconscious for seventeen days. He was abroad at the time, and had no treatment. About one year afterwards some pieces of necrosed bone were taken from a second fracture on the vertex of the skull he had received at the same time. He had then some slight weakness of his left side. For the last year the sinus had discharged freely, and he had had much headache. Finding on examination that some necrosed bone could be felt within the cranium in the direction of the internal occipital protuberance, I trephined the bone with an inch trephine, and enlarged the opening with Hoffmann's forceps. Having done this, I removed numerous fragments of the inner table of the skull, corresponding with the lateral and longitudinal sinuses. The dura mater within was thickened, and covered with granulations. The operation gave much relief to his head symptoms; but his lung trouble slowly extended, and destroyed life five months subsequently. After death the repair of the base of the skull was found to be complete, but the bone was thick and irregular. The opening in the cerebellar fossa was only partially closed.

The dura mater corresponding thereto was thick. The torcular Herophili and sinuses were healthy. The dura mater covering both cerebral hemispheres was tawny with old extravasated blood; indeed, a thin membranous film could be stripped off its inner surface. The summits of the middle lobes of the brain at its base showed some tawny erosion, evidently the result of former bruising. The lungs were extensively diseased.

The evidence I have thus laid before you of the pathological conditions of the brains of those who have suffered from what has been so long known as "concussion of the brain" will, I trust, be deemed sufficient to convince such as may be in doubt that they are really examples of cerebral injury; that term meaning cerebral bruising or laceration, with more or less hæmorrhage upon and into the substance of the brain or its ventricles, the amount of injury of every kind varying in degree in each case. In some it may be very slight, and in others severe.

You will likewise have probably observed—what the details of the cases I have brought before you so forcibly demonstrate—the lasting character of the changes which the brain may have undergone as a result of injury, and the evident slowness with which nature performs in this organ her reparative work; for, in some of the cases quoted, years had passed after the injury had been received, and yet marked evidence of its former existence was still present. Indeed, such evidence as I have laid before you of necessity draws out the question, Is a bruised brain ever thoroughly repaired? and are not the changes which the injury may have brought about fixed and permanent? It is to be regretted that an answer to these questions can only be given in an unfavourable form; and that, whilst we may be hopeful as to this complete repair and recovery from a slight injury or bruise, we are bound to regard graver cases in a more serious light, and to deal with them accordingly, since what evidence we possess seems to show that, when any portion of the brain has been severely or moderately bruised, it has been permanently injured. This evidence also dovetails in with the general experience, which tells us not only of the presence of physical head symptoms, but that the mental and moral characters of men are often permanently altered by a head injury.

With these facts and conclusions before us, am I, therefore, wrong in assuming with some confidence that you will see with me the expediency of combining with the term "concussion" that of "injury," and of describing such cases in the future as those of injury of the brain from concussion? The term "concussion" by itself is vague and delusive, whilst that of "injury" is clear and true, and conveys at once a meaning the force of which cannot be misunderstood. The word "concussion" later on may be dropped, and the simple term "injury" retained. With this starting-point, it would naturally follow that fractures of the skull in all their varieties, hæmorrhage into the cranium in all its forms, and compression of the brain, however brought about, will be regarded as complications of the one common and essential factor, cerebral injury, and not, as now, be regarded as separate and individual troubles to be dealt with independently. And even scalp wounds, the result of external violence, would assume a position in the surgeon's mind they ought to have, but have not yet attained; and consequently receive the attention to which they are entitled, not so much perhaps on their own individual account as simple wounds, but as wounds mostly brought about by direct violence applied to the cranium, and consequently liable to be complicated with some contusion of the cranial bone or intracranial injury.

(To be concluded.)

NORTH DEVON INFIRMARY.—Earl Fortescue presided at the annual meeting of this institution, held at Barnstaple on the 21st ult. The report showed that the income during the year amounted to £1551 19s. With reference to the insanitary condition of the house, detailed reports had been received from two London firms. The report of the committee was adopted. A motion that the proposed improvements in the ventilation, heating, and drainage be referred to the House Committee, with power to take such steps as they might deem advisable, was agreed to. The convalescent home, instituted and endowed by two generous donors for the benefit of North Devon, in connexion with the infirmary, is nearly completed.