

Henry Murney (1825–1907)

President of the Belfast Medical Society	1860–61
President of the Belfast Clinical and Pathological Society	1861–62
President of the Ulster Medical Society	1871–72

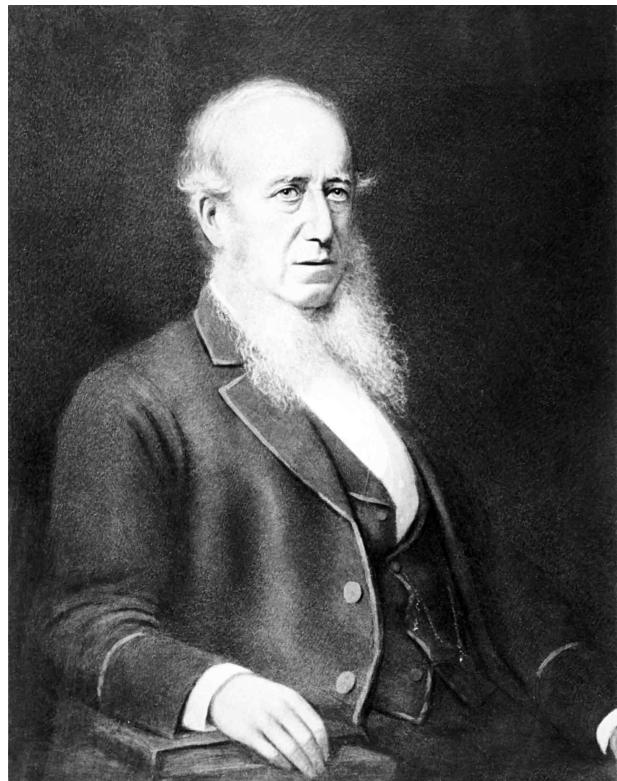
Presidential Opening Address
Belfast Clinical and Pathological Society
23rd November 1861

ON THE STATISTICS OF THE MORTALITY OF FRACTURES OF THE SKULL; EFFECTS OF OPERATION, &C., &C.

I HAVE frequently noticed there is a tendency to class all fractures of the skull together, and to look upon the patient's prospect as little short of hopeless. Serious as the mortality is, I did not think an examination of statistics would show so many sufferers rescued from death.

I would here observe that, as a rule, I look with great caution on statistical tables, knowing how frequently cases are classed together because of some trifling point of resemblance, although they may differ in most important particulars; and also, that it is much more likely a man would publish a successful than a fatal case, not that any desire to mislead or give a false idea of the mortality of a disease might exist; but when, from the serious character of the affection, it was expected the tendency would be to death, a sense of satisfaction, perhaps a lurking one of pride, that, contrary to all anticipations, recovery ensued, might tempt him to place on record that which probably he would not have done if the prognosis had been verified. Grave objections, no doubt; but, on the other hand, I may say, for some time past, our Medical Journals have contained records of all the most serious cases, with operations performed, in the London and principal Provincial Hospitals in England, we are thus likely to obtain an account of all unsuccessful as well as successful cases, and will be enabled to approximate the mortality of many injuries not yet precisely defined. I would add my belief that, from the fatal character of fractures of the skull, surgeons hesitate less about the publication of the cases than in many other affections requiring interference. These reasons I consider are sufficient to warrant a greater degree of confidence than is usually reposed in statistical tables, and I make use of them as giving by figures an approach to the mortality, effects of operation, &c., &c., and some other particulars in this class of affection.

I have records of several cases of fractures of the head which have come under my notice, I shall take the



liberty of referring to a few of them where I find they illustrate portions of the subject. My information is not so accurate on some points as I could wish: for instance, in fracture of the base, the reporter frequently mentions that fact without specifying the part of the skull involved; and in injury of the superior region of the head, the calvaria is named without specifying the bone or bones injured.

I have taken a period of 10 years, from 1851 to 1860, inclusive, and have tabulated the cases of fractures of the skull to the number of 253, which appear in the following Journals: – *Times and Gazette*; *Lancet*; *Dublin Medical Press*; *Dublin Hospital Gazette*; *Edinburgh Monthly Journal*; *Dublin Quarterly*; *Guy's Hospital Reports*; and the *Trans. Belfast Clin. & Path. Soc.* I have also examined *Braithwaite's Retrospect*, and the *British and Foreign Medico Chirurgical Review*. I had not access to other Journals. Twenty five cases were treated by practitioners not attached to public institutions; all the others were contributed by the attendants on the large metropolitan and provincial institutions, or by medical officers in the public service.

Of course I shall follow the usual division of the subject, viz.: – Fractures involving the calvaria or lateral

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parts of the head, and fractures of the base; and first of the former: – In addition to cases I have treated myself, I have the particulars of 187. In 84 of these the fracture was situated in one of the parietal bones; in 57 the frontal; in 9 the occipital; and in 37, two bones of the calvaria or lateral regions of the head were implicated, or the precise part of the skull-cap was not specified.

The mortality in these several localities was as follows: – most serious of the last mentioned – out of 37 cases, 22 died; then in fractures of the occiput – of 9 cases, 5 died; next we have injury to the frontal bone – of 57, 25 died, and one remained under treatment. Fractures of the parietal bones were most numerous and least fatal, as of 84 cases, 34 died, and one remained under treatment. As a summary we have 86 deaths; 99 recoveries; and two undisposed of, in a total of 187 cases, being 46 per cent. of deaths. A question has occasionally arisen, which are the most fatal fractures of the superior region of the head? The above shows that injuries to the posterior region are most, and to the superior least dangerous; and that fractures of the frontal occupy the middle place in danger as in frequency.

Of the 187 cases the bone was depressed in 149. Should the bone be elevated in every such case? should elevation be performed on the occurrence of reaction, whether symptoms of compression are present or not? or would the prospect be more satisfactory by delaying till well marked signs of pressure are exhibited? does the age of the patient modify in any way our opinion?

On reference to some of the older writers, as Pott and O'Halloran, we find that every case of fracture, with depression, was considered fit for the trepan. In the introductory observations to his work on injuries of the head, published in 1793, the latter writer lets us know, in his quaint style, how frequently he was called on to perform this operation, he writes: – "I have had no less than four fractured skulls to trepan on a May morning, and frequently one or two. In the course of above thirty-five years practice, I may safely affirm, because truly, that on an average, one month with another, from three to four cases have fallen to my share, of either fractures, concussions of the brain, or extravasations." Again he says, "Every fracture with depression necessarily demands the operation; and though some particular cases may be adduced, when nature has somehow or other brought about the business of healing, yet it is by no means to be trusted to; and the surgeon is inexcusable who fails to attempt, at least to propose and press it. Simple fractures of the cranium, with depression, when relieved on the spot, or in the space of two or three days, almost always terminate happily. In the course of more than 200 accidents of this

simple kind, I cannot recollect a failure in a single instance."

"Fractures without depression do not demand operation." Pott considers all depressed fractures require operation; and nearly all undepressed, also require the interference of the surgeon. He says, "perforation is absolutely necessary in seven cases out of ten, of simple undepressed fractures of the skull. Let us for a moment inquire why it is so. The reasons for trepanning in these cases are, first, the immediate relief of present symptoms arising from pressure of extravasated fluid; or second, the discharge of matter formed between the skull and dura mater, in consequence of inflammation; or third, the prevention of such mischief as experience has shown, may, most probably, be expected from such kind of violence offered to the last mentioned membrane. These are the only reasons that can be given for perforating the skull in the case of an undepressed fracture; and very good and very justifiable reasons they are, but not drawn from the fracture."

In another place he says, "I have no doubt that although by establishing it as a general rule, to perforate in all cases, some few would now and then be subject to the operation, who might have done very well without it; yet, by the same practice, many a valuable life would be preserved, which must inevitably be lost without it, there being no degree of comparison between the good to be derived from it when used early as a preventative, and what may be expected if it be deferred till an inflammation of the dura mater, and a symptomatic fever make it necessary."

I find elevation of depressed bone was practised in 124 of the cases I have tabulated, of these 60 died; 62 recovered; and 2 remained under treatment; as nearly as possible the deaths were 50 per cent.

In 25 cases of fracture with depression, no operation was performed. On analysis of the symptoms of those who recovered – one had profound insensibility; another was insensible and convulsed; another had partial paralysis; the remainder were partially insensible, or had threatened inflammation in the head. Of those who died the symptoms recorded are: – insensibility in one; paralysis in another; epileptic fits in a third; (I use the expressions of the reporters,) 7 died; 18 recovered: being a mortality of 28 per cent.

Some interesting Cases of Fracture of the Calvaria with Depression, have come under my observation in hospital: –

A lad 16 years of age, while engaged at work in one of the ship yards, received a blow on the side of the head from a heavy piece of timber which had fallen a height of 10 or 12 feet; when brought to hospital we were informed he had vomited a large quantity of blood;

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he laboured under collapse first, then concussion; on careful examination of the head (there was no scalp wound,) a fissure extended from the left parietal protuberance forwards for about one and a half inch, bifurcated, producing the shape of the letter Y; the piece of bone between the limbs of the letter, and also, one margin of the fissure, in its posterior part, were depressed, I would say rather more than the thickness of a half-crown. The symptoms of concussion yielded after a time, and were followed by cerebral irritation, and inflammation of a not very intense form. When convalescent I felt dissatisfied with his stolid stupid manner, but learned from his friends he was of a sulky disposition, and that his mind and character were as before the accident. The treatment adopted was cold applied to the head, mercury in small doses, until the constitutional effect was produced, and when necessary, purgatives.

In this case, from the vomiting of blood, I feared more serious mischief than the fissure of a small portion of bone. The possibilities of fractured base, or of injury to the liver, or some important abdominal organ, suggested themselves; but when hours passed by and full reaction was established without its recurrence, my attention was fully turned to the concussion; as it subsided from the depression of bone, I looked for the appearance of symptoms of compression – had such manifested themselves, I would have cut down and raised the bone.

A few days after the admission of the last, a boy, aged 13 years, came under treatment. Two evenings previously, while seeking for a ball, he had fallen from a man's shoulders and alighted on his head; he is reported to have been insensible for a short time, and on recovery to have vomited repeatedly, and complained of pain in the part injured, with general headache and sickness of stomach. On admission the head was shaved, no wound or abrasion was visible, but a fissure of the skull, as in the other case, was felt, extending from the left parietal protuberance forwards almost to the anterior border of the bone; the upper margin of this was depressed to about the same extent as in the other case.

I placed him on low diet, gave him some alterative doses of mercury, and kept him in hospital for a time.

Here we have one of those most infrequent cases – a grave injury followed by most trifling constitutional disturbance; in fact, from the time he came under my care he was well – all headache, &c., &c., had passed off. My treatment was merely precautionary.

Again, about a week later, a fine boy, about eight years old, was brought to hospital – a log of timber had fallen on him, fracturing the right forearm very severely, and causing a wound which commenced at the right

frontal protuberance and stretched upwards and backwards about four and a-half inches in length; the scalp was separated to a considerable extent, and a fracture, parallel to the wound, occupied fully three inches of the frontal and a small portion of the parietal bones; there was depression to fully the thickness of the skull. In the unavoidable absence of my colleague on duty, I saw him about an hour after admission. Bodily warmth was then restored, his pulse and respiration were slow; pupils dilated, uninfluenced by light; he lay quietly, head resting on the right (the injured) side; when turned on the left side he gave a fretful cry and endeavoured to replace it; by sharp speaking or pinching he could be partially aroused – give a monosyllabic answer, and then sink back into insensibility. The house surgeon informed me, half an hour before my visit he could be roused with much greater facility, when he gave his name, residence, &c., &c. That I might have an opportunity of noting the increase of the coma, I deferred operative interference for an hour, when I returned and examined him, and was satisfied the insensibility was greater than before.

I then had him removed to the theatre for the purpose of operation; immediately before commencing, I again essayed to arouse him, when suddenly he opened his eyes and answered quite collectedly, although slowly and rather stupidly. Under these circumstances I did not deem it necessary to raise the depressed bone.

The boy passed to the care of my colleague; he laboured under concussion for a time, and gradually recovered. He was discharged in seven weeks.

This was to me a most interesting case; had the profound insensibility, which was twice so marked, continued, my treatment would have been elevation of the bone with Hey's saw, if possible, if not, by the trephine first, then the saw. The occurrence of insensibility, followed by a state from which he could be aroused, I believe, was due to cerebral congestion, for, after severe injury the circulation is embarrassed and imperfectly performed; and, I have several times noticed, although not so well marked as in this case, the insensibility sometimes more, sometimes less profound, without any apparent cause.

Ten months ago, a boy, 16 years of age, fell a height of 12 feet in the hold of a ship on Queen's Island, he alighted on the posterior part of his vertex. I was in the hospital on his admission, and was informed that he was insensible for a period of about 10 minutes after the accident, but from the time he was placed in the ferry boat until his arrival here, he was perfectly collected. There was a wound one and a-half inch long, situated over the upper part of the occipital bone; almost at the summit of that bone a V shaped fracture was seen, the

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point directed upwards; the limbs were each about one inch long; the bone was depressed fully the thickness of two half-crowns; he merely laboured under collapse, and was quite astonished when I ordered him to bed. The wound healed up, and he was discharged in a month.

I saw him six months afterwards, he had not experienced the slightest bad effects from the fracture.

This is another example of a most serious injury without the appearance of a single bad effect – in fact, so well did he feel, I had considerable difficulty in keeping him in hospital for a reasonable time.

Is the danger to the patient increased by cutting down to make an examination merely of the site of fracture – by, in fact, rendering the fracture which was simple, compound? Most surgeons are opposed to this treatment, Sir Astley Cooper, in his forcible language, says, “the man who would do so should be cut for the simples.” Mr. Guthrie and others do not consider the patient’s danger is in any way increased by it.

I believe the principal advantage to be attained by it is, that we can ascertain more accurately the extent to which the cranium may be fissured, and the amount of depression of the outer table; also, if death of a piece of bone is about to take place we are made cognizant of the fact at an early period by its altered appearance. Although I would not practice it heedlessly, or without due consideration, I should have no hesitation in cutting down, provided I was uncertain as to the extent or amount of the depression of bone.

Of fractures without depression we have reports of 38 cases, of which number 25 were subjected to operation and 13 were not; of the former 13 died, 12 recovered; of the latter 5 died, 8 recovered. Among those subjected to operation, we have 3 cases of paralysis; 5 more or less convulsed or with epileptiform fits; 4 insensible; 3 of compression; 3 of encephalic inflammation; and, what I consider strange, 5 are marked as labouring under very slight symptoms or none at all. Those not submitted to operation suffered from slight concussion, collapse, effects of shock, &c., &c. One, a recovery, had epileptic fits.

In December, 1858, I brought before the notice of the Belfast Clinical and Pathological Society, some cases of fracture of the skull. One was a patient with fissure of the frontal bone. In giving a brief account of his case, I stated, he laboured under paralysis which gradually became general. Under treatment this slowly passed off, and he was discharged from hospital quite restored. Twelve months after, this man came under the care of one of my colleagues, he had fallen into a vat of boiling ley in a bleaching establishment. He told me he had enjoyed excellent health since his dismissal; he had not suffered from headache, loss of power, or any effect of

his injury. In a few days after his second admission he was attacked with tetanus, and died. I made an examination of the head and removed the portion of the calvaria which had been fractured, and which was completely united. The dura mater was most intimately adherent to the bone in the vicinity of the fractured part. The brain, &c., &c., were perfectly normal.

A man, aged 22, had the upper part of his occipital bone fractured by a heavy piece of iron falling on him, from a height of 12 or 14 feet. When admitted he laboured under the ordinary symptoms of collapse; then well marked concussion. The fissure of the bone could be readily detected at the bottom of an extensive wound. There was no depression. In a month he was discharged from hospital perfectly well. The case was an average one, without the appearance of a single peculiar or anomalous symptom.

Thirty-four cases with depressed bone, although not labouring under symptoms of compression, were operated on; of these, 22 recovered, 12 died. As many of the contributors do not mention the symptoms (if any) which existed before operation, I have no doubt, this series should be much greater. I have, however, merely tabulated those in which the writer distinctly records the absence of compression.

I must confess my inability to understand the indication for the use of the trephine or saw, where the report states the patient was “sensible” or had no symptoms of compression. And, although I find this practice has been followed by some surgeons, I would not pursue it, therefore, cannot commend it. I consider, at all times, even in the hands of the most skilful, the use of the trephine must expose the patient to considerable risk of encephalic inflammation, and, that we are not justified in operating as a mere precautionary measure, but only in those cases, in which, from symptoms of compression, we have reason to believe there is pressure on the brain which may be relieved by interference.

There may be an exception to this rule, as occurs frequently in military practice, a bullet producing what might be styled an indented or stellate fracture; or in civil practice, a blow from the sharp angle of a brick or slate, driving in the outer table and breaking the inner to a greater extent. Here we might expect pressure on the brain or more extensive laceration of the membranes than the slightly depressed condition of the outer table would indicate; in such a case the appearance of less urgent symptoms, as convulsive twitchings, epileptiform seizures, would be a sufficient warranty for the use of the trephine.

I may here appropriately refer to the question of the frangibility of the tables of the skull. For many years my anatomical experience made me look with

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considerable doubt on the generally received opinion, that the inner table is so much more easily fractured than the outer. I often observed, if great violence be applied to a skull-cap, the tables would be fractured to about the same extent. In 1858, in a most valuable series of lectures, delivered in the College of Surgeons, England, Mr. Prescott Hewett, not only noticed this, but carried his observations further, he found where violence is applied from within outwards, the outer table is usually injured more extensively than the inner – if from without inwards, the reverse; where great force is used, both will be broken to about the same extent. On reading his remarks I tried these experiments repeatedly, and believe his statements are correct. If, then, an individual has fallen from a great height, alighting on his head, or has received a fracture in some other way, from great violence, I would anticipate the tables of his skull would be broken to the same, or nearly the same extent, but, if a less force were applied to a small surface, I would dread splintering of the inner table.

Another question of interest is that of injury to the brain. We all know the prospect is much brighter where bone is merely depressed without lacerating the dura mater; and injury to that membrane is less fatal than where some of the cerebral texture is torn, and possibly protruding from the wound. Some of the most experienced surgical writers look upon this latter form of injury as almost necessarily fatal – the mortality is very large – and yet many recover. I have made a distinction between protrusion of the brain and hernia cerebri, as it is at times called, on the one hand, and simple wound or laceration on the other. Where wound of brain has terminated in hernia, I have placed the case under the former head.

Of cases styled protrusion or hernia, there were 35 reported – 17 died, 18 recovered. Of wound or laceration, 27 cases – 18 died, 9 recovered; total, 62 cases, with 35 deaths. Of these, 9 had more or less of paralysis or convulsive twitchings; 7 symptoms of inflammation of varying degrees of intensity; 9 compression, the majority well marked, although some were not very profound. Then we have concussion, collapse, and shock; several described as not labouring under any symptoms; and some, in which the reporter mentions many of the leading features, but does not state this particular.

On looking at the mortality as it occurred at the different periods of life, we find up to the age of 10 years, inclusive, there were 24 cases with 9 deaths; between 10 and 20, 49 fractures, with 16 of a mortality; from 30 to 40, 86 cases, 48 fatal; and from 40 to 60, 24 with 10 deaths; two had not terminated when their reports appeared.

I do not consider it necessary to give an analysis of the plans of treatment pursued. In a considerable proportion indeed, the writers seem to have considered the indications so obvious, as not to have recorded it at length. I would merely observe, venesection was practised in 24 cases only. A marked contrast to the custom of the older writers, and also to the injunctions of many within a very recent period. Tartrate of antimony also seemed to be at a discount, for I find it was used in three instances only. The preparations of mercury were most generally employed, in some, merely as purgatives, in a considerable number until the constitutional effect was produced.

I would briefly sum up my views of fractures of the calvaria. The most dangerous are those of the occipital; the frontal next in order; the parietal least so.

The mortality in fissure of the calvaria and depressed fracture is nearly equal, considering all the cases. But take all the cases, whether depressed or not, in which operation was performed, the death rate was 50 per cent. All the cases where no operation was performed, the per-centrage was about 34; or if we contrast those cases in which there was depression but no operation, the mortality was 28 per cent.; with those also depressed and operated on without any symptoms, the deaths were 36 per cent. These facts must, I consider, point to the conclusion, that operative measures should only be used as a *dernier ressort*.

The cases of fracture without depression subject to operation, showed a mortality of 52 per cent. Similar cases not operated on, presented 33 per cent. of deaths. In cases of injury to the brain, the mortality was about 43 per cent. Operation is fully warranted when the injury is of the indented class already referred to.

In simple fracture, where there exists a doubt as to the extent of the depression, I consider the surgeon adds extremely little, if anything, to the risk of his patient by cutting down. Fractures are borne with greatest immunity in the first and second decennial periods. The danger to life is greatly increased in the third and fourth, and again diminished in the fifth and sixth periods. I have given a brief report of six cases of fracture of the calvaria with recovery in each. In two of these the occipital – in two the parietal – and in one the frontal were broken – and in one case the frontal and parietal were both involved.

I have examined the reports of 66 cases of fracture of the base of the skull. Of this number, 46 died, 20 were restored; about 69 per cent., an enormous death rate.

When we consider the great injury inflicted on parts so nigh to the most essential portions of the nervous system, generally themselves sufferers from

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laceration or extravasation, and the uncertainty which surrounds the recognition of these fractures during life, we need not feel surprise at the short list of authenticated recoveries.

In those injuries hitherto considered we had, generally, tangible and frequently visual evidence of their existence. In the present class, during life, in many cases we are dependent for our prognosis on symptoms which bear no proportion to the amount of fracture sustained.

As an illustration, I would mention the following: – Within half an hour of the admission of the boy with compound fracture of the frontal and parietal bones, whose case I have related just now, a man, aged 60, was also admitted to hospital. While engaged white-washing a house, on a ladder about 20 feet high, a sudden gust of wind precipitated him to the ground. When I saw him about half an hour after admission, the surface was cool, not cold; he was perfectly collected; described how he had been engaged before his fall; said he was insensible until shortly before his admission; complained of pain across the temples. I noticed he was somewhat (a little) deaf; I asked was this the result of his injury, he stated he had been deaf for many years – he had bled from the right ear; but when I visited him within an hour of the accident the hemorrhage had ceased, and there was a little dried encrusted blood in the meatus externus.

Immediately after leaving the bed, the house surgeon, in conversation, suggested the existence of fracture of the base. My reply was, it may be present, but if we have not an opportunity of examination we are not warranted in placing the case on record as one of this injury.

This, with the other patient, passed to the care of my colleague on his return to town. Frequently, when in the ward, I spoke to the man; his mind was quite clear; he many times complained of being deprived of his snuff box. The only circumstance which attracted my attention was, he always lay on his back, and complained of pain in his head if the nurse turned him on his side. Until three days before his death, when he had symptoms of encephalic inflammation, his mind was perfectly clear. Death occurred ten days after admission.

I was not present at the post-mortem, but was informed the brain showed evidence of inflammation, and a fracture passed through the right petrous bone, without involving the tympanum.

Now, I consider the absence of all head symptoms fully warranted the opinion I expressed. The small quantity of blood which flowed from the ear was of no value as a diagnostic, and the trifling complaints of the patient might readily be caused by contusion.

I consider these two cases are worthy of being placed on record. First, a sailor, 20 years of age, was

admitted on 16th. June, 1859. While intoxicated he had fallen into the hold of his vessel, a height of 12 or 14 feet, alighting on his head, and receiving a fracture on the left side of his forehead from the sharp angle of a brick. The fissured condition of the bone was visible at the bottom of an extensive scalp wound, it stretched down to the supra orbital foramen, and was of a † shape. The amount of insensibility was only partial, as he could tell his name and age. His breathing was natural; pulse 60; skin cool; on being let alone he turned off to sleep immediately. There were two small contused wounds on the left side of the face, one beneath the outer, the other beneath the inner canthus; for some hours continuous bleeding poured from these wounds, followed, for 24 hours, by copious weeping of serum. There was considerable extravasation of blood behind the left ocular conjunctiva, and the eye-lids were very much ecchymosed. From this I diagnosed that the fracture, which was traced to the supra orbital foramen, extensively involved the roof of the orbit. I also considered the serum was arachnoidean which had passed behind the ball, and made its way out by these wounds. On the 18th, he had well marked symptoms of inflammation of the encephalon; on the 21st, he had paralysis of the right side; he died on the 25th. – nine days from the injury. Insensibility was almost complete after the first day.

I made a post-mortem 12½ hours after death. A large collection of pus occupied the cavity of the arachnoid anterior to the left hemisphere; the arachnoid, especially in the neighbourhood of the superior longitudinal sinus, was thickened and opaque; general vascularity of the pia mater. On removing the brain, two clots, each about the size of a shilling, were found, one on the roof of the left orbit, the other in the middle fossa of the left side; the brain substance was normal in consistence, but highly vascular in all parts, both cortical and medullary. The fracture in the calvaria was more extensive on the inner than the outer table, without depression, extending from below the left frontal eminence to the margin of the orbit at the supra orbital foramen, in length, say one and three-quarters inch; a similar fissure extended across the top of this, at right angles, producing a T shape. In the base the fracture stretched backwards, from the supra orbital foramen through the roof of the orbit, completely breaking away a piece of bone, nearly circular in shape, of the size of a shilling, rather internal to the centre of the orbital roof; this could be readily removed by the forceps; the continuation of the fracture extended from the left towards the right side, through the olfactory process and body of the sphenoid bone, into the right side of the basilar portion of the occipital, terminating half-inch anterior to the foramen magnum. None of the other

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cavities were examined.

The extravasation beneath the conjunctiva enabled me to express the opinion that the fracture extensively involved the roof of the orbit. The weeping of serum also pointed to fracture of the base. I had never witnessed it from this situation, nor do I recollect having seen it recorded – I think it must be infrequent.

The second case was somewhat similar: – On 11th May, last year, a man, 19 years of age, fell from a scaffold 20 feet high, alighting on his head. On admission he had bleeding from the left ear and nose; he had also extravasation of blood beneath the left ocular conjunctiva; he had symptoms of collapse first; then concussion; during the day he several times vomited blood. As the effects of the concussion passed off in the evening and early part of the night, he was not only able to answer questions, but manifested curiosity as to where he was; how the accident occurred, &c., &c. This continued till within an hour of his death, which took place 13½ hours after the accident. On examination, two fractures extended from the left frontal eminence downwards; one in front of the external angular process, the other behind it; the brain was considerably congested, but was not lacerated or injured in any part; a small extravasated spot was on the most prominent portion of the middle lobe of the left side; another over the superior vermicular process of the cerebellum; and a third on the upper surface of the tentorium, near the right perpendicular semi-circular canal; the brain substance was healthy.

There were two fractures in the roof of the orbit – one at its fore, the other at its back part; both were connected with the fissure which stretched down the forehead; two also ran in the middle fossa and terminated at the foramen ovale. Here the bleeding from the ear and nose, with the vomiting of blood, pointed to the existence of fracture of the base; the extravasation behind the conjunctiva, to injury of the orbital roof.

In the former case, the fracture stretched into each of the three fossæ, in this the anterior and middle were involved.

Two other instances of extensive fracture of the base came under my notice. One, an elderly man, was knocked down in the street by a blow from the shaft of a car, he lived five days. On *post-mortem* at least one ounce of blood lay between the dura mater and the skull-cap; there were three clots on the surface of the brain, and there was laceration of the grey matter on that portion of the middle lobe which occupies the middle fossa; the calvaria was most extensively broken, and the anterior and middle fossæ fractured. The other, also an elderly man, had fallen down the cabin stairs of a steam boat, a height of about 12 feet; he lived 24 hours.

On *post-mortem* the condition of the brain and membranes was much the same as just described; there was no fracture of the calvaria; in the base the middle fossa was extensively broken, and the lesser wing of the sphenoid chipped off. I do not give the details – as neither of these cases presented features of much interest, but place them on record for future statistical inquirers.

From the accounts of the *post-mortem* examinations, the following were the situations of the fractures: – Of the middle fossa alone there were 11 cases; of the anterior 10; of the posterior 2; of the anterior and middle 4; of the posterior and middle 9; one of these had separation of the coronal suture. There were 5 cases of fracture running into each of the three fossæ; three of these had, in addition, separation of the coronal suture. There were 5 cases in which the precise locality is not described. On analysis of the fatal cases, we may fairly exclude the following, when considering the per centage of mortality. First, a case of fracture of middle and posterior fossæ, with fracture of some of the lumbar vertebrae; second, fracture of the anterior fossa, and of the seventh cervical vertebra; third, fracture of middle and posterior fossæ, with fracture of several ribs and other injuries.

In such instances the serious injuries mentioned would of themselves suffice to cause fatal issue.

Again we have unusual, and I may say, necessarily fatal cases, such as a piece of nail-rod penetrating the roof of the orbit, lacerating the brain, and causing copious hemorrhage by rupture of the anterior cerebral artery.

The extremity of a walking-cane passing through the nostril, perforating the ethmoid and sphenoid bones, and impacted in the lower part of the brain.

Brass ferrule of an umbrella perforating the roof of the orbit and impacted in the brain – and a piece of tobacco pipe lodged in the same locality. The last three were only discovered on *post-mortem*. In all, 7 to be deducted from the number of 46 deaths, which would leave 39. Add to these the 5 cases I have now recorded. This would leave the mortality as already stated. I have brought forward some of, to me, the most interesting matters connected with 193 fractures of the calvaria, and 71 fractures of the base of the skull. In all, 264 cases. Many of the matters I have only touched upon would, I know, supply ample material for valuable papers.