

C A S E
OF
FRACTURE OF FOUR CERVICAL VERTEBRÆ
WITH DISLOCATION,
PRODUCED BY SLIGHT AND UNUSUAL CAUSE, AND RESULTING
IN IMMEDIATE DEATH;
WITH
NOTES OF A CASE OF FRACTURE OF THE OS CALCIS.

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COMMUNICATED BY
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On the night of Sunday, October 28th, 1855, a man was brought to the Hospital in a cab; and, on examination, was found to be dead. The men who brought him gave the following account: A number of friends were drinking together in a public-house, when the deceased, in sport, snatched a hat from the head of another man, and placed it upon his own, calling out for somebody to "bonnet" him. Five or six blows were struck with the open hand on the crown of the hat, when he rushed at one of the party and butted him in the chest. This man seized the hat by the

brim and forcibly twisted the head from side to side several times, pushing the deceased back upon a form in the sitting posture. His head then dropped forwards, the chin resting on the chest, and, muttering "Fetch a doctor," he slipped off the seat upon his knees, and would have fallen upon his face had not some of the bystanders caught him in their arms. They took him directly to a surgeon in the neighbourhood; but, beyond a groan, the injured man gave no evidence of life. He was brought to the Hospital about forty minutes after the accident; all the party were quite sober.

The body, awaiting an inquest, was not examined until the fourth day after death. The head and neck were preternaturally moveable; but, beyond a graze of the skin upon the point of the chin, there was no external mark of injury.

Between the deep-seated muscles attached to the upper cervical vertebræ a small quantity of blood was extravasated. There was fracture of the posterior arch of the atlas, also through the laminæ of the second, third, and fourth cervical vertebræ directly behind the articulating processes, completely separating them from their respective bodies, in addition to which the laminæ of the third and fourth on the left side were comminuted. The line of fracture passed through the bones obliquely from above downwards and forwards. The third vertebra was partially dislocated forwards with its right inferior articulating process resting in the groove for the fourth spinal nerve. The corresponding process of the left side was displaced upwards and rather forwards, both the capsular ligaments being partially torn through. The apices of these processes were broken off, and remained attached to the laminæ on either side. The point of the superior articulating process of the fourth vertebra was also broken off on the right side.

The posterior atlo-axoid ligament was much bruised, in parts almost disorganized. The ligamentum subflavum between the second and third vertebræ was torn away from the lamina of the second.

The areolar tissue occupying the space between the bones

and the membranes of the cord, from the first to the fifth vertebra inclusive, was filled with coagulated blood. The theca vertebralis did not contain any blood. The spinal cord was not flattened; but opposite the third vertebra it was bruised, blood being effused into the substance of the anterior and lateral columns.

The posterior common ligament was much stretched, with a longitudinal rupture, to the left of the median line about an inch in length opposite the second and third vertebræ, through which a mass looking like coagulum protruded. This, on examination, proved to be intervertebral substance from between the third and fourth vertebræ, which was crushed and mixed with small scales of bone. A probe could be passed through this opening in the ligament downwards behind the body of the third vertebra into the space left behind it and the fourth. The odontoid process with the alar and transverse ligaments was uninjured. The anterior common ligament was entire but tensely stretched.

The brain and medulla oblongata presented no lesion.

The bones appeared to be quite healthy, and the manipulation necessary to their preservation has since shown them to be so.

On reviewing this case in all its bearings, the extreme importance of it, in a medico-legal point of view, cannot fail to strike the observer; for, had not the small amount of violence which was used been witnessed by so many persons, it would scarcely have been believed that fracture, with dislocation, could possibly be produced by such a trifling accident.

To satisfy myself that the statement which I had received was correct, I took the trouble, five or six weeks afterwards, when all motive for concealment was at an end, to call upon six of the men separately, and to inquire again into the manner of the accident; but they completely corroborated the statement before given. We must, therefore, endeavour to account for so much mischief by other causes than a mere blow with the open hand.

The position in which the spine would be bent with relation to the head, the latter being then thrust against an opposing body, together with the corresponding *contre-coup* will, I think, satisfactorily account for the injury. The spinal column being semiflexed, with the head thrown backwards upon it (as must have been the case when the man was bent in a butting attitude, endeavouring at the same time to keep his hat from falling off), the head with the two upper cervical vertebræ would have an axis, which would meet the rest of the spinal column at an acute angle, the apex of it centering in the third vertebra. At the same time the bodies of the cervical vertebræ would be separated from one another as widely as possible, and the spinous processes made to press upon each other firmly. If, while in this position, the man rushed forward and brought his head in contact with an opposing object, force would be applied by *contre-coup* in a direction opposite to that of the body, and the consequence would be the meeting in the third cervical vertebra of the two forces : that communicated through the head and two upper vertebræ, would force the third vertebra downwards and backwards, while that communicated through the rest of the spinal column would press it downwards and forwards. If these forces met at a right angle no doubt the body of the bone would be crushed ; but if, as I presume in this case, they met at an acute angle, the pressure would be communicated to the articulating surfaces and spines, the articulating surfaces would give way, and the vertebra slipping forwards, the weight of the body would be suddenly thrown upon the spinous processes, and such forcible compression be produced as to cause the fracture of them. The ligamentum subflavum would at the same time be ruptured, while the laminae of the third and fourth vertebræ on the left side would be comminuted, from being made to press against each other, in consequence of the displacement described ; the third on the right side being internal to that of the fourth would escape pressure.

The space between the arches of the vertebræ and the cord, being in this region considerable, there would be

sufficient room for the medulla to pass without suffering compression from such a disarrangement of parts; but the plexuses of veins, which ramify so plentifully upon the vertebræ within the canal, would be lacerated, and death would ensue from pressure upon the spinal cord.

Such was the state of parts found, and I can only, satisfactorily to myself, explain this injury in the manner above described.¹

This opinion with respect to the mode of accident is corroborated by Malgaigne, where he states that *contre-coup*, with a forced flexion of the spinal column, is by far the most common cause of fracture.²

Dupuytren, in his list of cases, twenty-eight in number, does not record any at all analogous to this; Malgaigne mentions nothing similar as occurring in his own practice; but he refers to a case cited by Reveillon, in which a transverse fracture of the body of the fifth cervical vertebra was occasioned by a sudden and forcible extension of the neck when the head was already bent backwards.³ Ollivier has collected many cases, but none parallel to this.

There is an instance, related by M. Lasalle, in the 'Gazette Médicale,' of November 21st, 1841, where by a sudden and forcible extension and flexion of the head, death immediately resulted, the ligaments being ruptured, the intervertebral substance torn through, and the vertebræ separated, with effusion of blood into the theca vertebralis. I can find no cases recorded by English surgical writers but such as were occasioned by external violence directly applied.

It is manifest that the injury, in the case which forms the subject of this communication, occurred in no ordinary

¹ It is also possible that death might have been occasioned by compression of the cord by the fractured bones, which had afterwards changed their position in consequence of the various movements to which the body was subjected after death.

² Vide 'Traité des Fractures et des Luxations,' par J. F. Malgaigne, tome i, pp. 418-19-20.

³ This case is also mentioned by South, in his translation of Chelius' 'System of Surgery,' vol. i, p. 533.

manner, from the fact that it was the third vertebra which was displaced, and which, according to Malgaigne's experience, is (with the exception of the atlas) the least liable to dislocation. He records forty-one cases of luxation in the cervical region, and in a single instance only was the third vertebra removed from its position, and then but partially: this experience of Malgaigne is confirmed by all the recorded cases.

The rarity, then, of luxation of the third cervical vertebra being established, it may be presumed that it would require extraordinary causes to produce it, and would be attended with greater injury to other parts than any more common displacement.

NOTES

OF A

CASE OF FRACTURE OF THE OS CALCIS.

BY THE SAME AUTHOR.

Thomas Bassett, æt. 44, stableman, admitted into St. Mary's Hospital, September 19th, 1855, under the care of Mr. Ure. This afternoon, about an hour before admission, he jumped from the wheel of a carriage, alighting upon his heel; this gave way under him and he fell, but arose directly, experiencing great pain, and inability to put the sole of his foot to the ground; he walked, however, into the hospital, from the street, with assistance. There was some swelling and ecchymosis, but no distortion of the foot. On examination, there was found to be unnatural mobility of

the heel, and crepitus was obtained by moving it laterally, as well as by holding the heel and flexing the ankle; when the sides of the foot were grasped firmly, embracing the malleoli, and the patient moved his toes, crepitus was also produced. When told to walk, he could bear his weight partially upon the toes, but a loud snap was heard, and he felt a grating at the heel; on pressing the calf of the leg, or irritating the gastrocnemius, this was also found to be the case, the sensation of crepitus being communicated to the hand which grasped the calf as well as to that which held the heel; he suffered intense pain during these movements. There was very great swelling and extravasation of blood, extending as high as the knee; when this had subsided sufficiently to allow of further examination, crepitus was no longer obtained by irritating the muscles of the leg, although it was produced by all the other manipulations before mentioned. The os calcis appeared to be broken about the junction of the posterior two thirds with its anterior third, and the fracture seemed to pass from above obliquely downwards and forwards. All movement was prevented by paste-board splints; but it was not until November 5th that he was able to walk at all. On the 21st of November he was discharged.

About a month afterwards he returned to the hospital, and on removing the splints, firm union was found to have taken place, with a great deposit of callus below and in front of the malleoli, which somewhat interfered with the movements of the joint, but quite confirmed the diagnosis of the fracture previously given.

Fracture of the os calcis appears to be regarded as a very rare accident by English writers, and is treated of very briefly by them; but Malgaigne, who has devoted much attention to, and published a memoir on, this subject, speaks of it as much more common than is usually imagined; and he cites several instances which occurred in the practice of others, as well as in his own.

In his treatise on fractures and luxations, he says, that "the fracture is always situated behind the astragalus;"

and Sanson, in his article on Fractures, in the 'Dictionnaire de Médecine et Chirurgie pratiques,' states, that "up to the present time it is only behind its articulation with the astragalus that we have found it fractured." But this instance would seem to disprove those statements, for the callus deposited shows that the fracture was situated in front of the larger articulating facet for the astragalus.

Portscript.—October. Since writing this case, I have found an instance of fracture of the anterior third of this bone, recorded in the 'London Journal of Medicine,' for January, 1851, as having occurred in the practice of Dr. Uhde, of Brunswick. Two other cases of fracture of this bone have also since been admitted into St. Mary's Hospital; the one on July 1st, in which the posterior and upper extremity was separated from the rest of the bone: caused by jumping from a height of eighteen feet, and alighting upon the heel. The other, on August 6th, in which the bone was broken at the junction of the posterior third with the anterior two thirds: caused by a fall from a window of some height, the heel first coming into contact with the ground.