

the patient was unconscious; the pulse was scarcely perceptible, and the whole body was suffering under paralysis. Ehrlich directed the shoulders to be held by one assistant, and the head to be drawn upon by another, while he pressed with his own hands forcibly upon the displaced atlas from behind. After several fruitless attempts, the reduction took place, accompanied with a sound distinctly audible to all of the assistants; the head resumed its position firmly, and the arms began to move. The head was afterwards maintained in place by a bandage. The cure proceeded rapidly, and after a time no trace of the injury remained but a disagreeable tension in the nape of the neck whenever he moved his head briskly to the one side or the other.¹

Peabody,² in the case of a man who had subluxation of the atlas, occasioned by a fall from a height upon his head, and in whom death seemed imminent, succeeded after several trials. The patient was unconscious, his eyes were closed, and his pupils dilated. Immediately upon the reduction having been effected, which was accompanied with a violent *craquement*, the patient opened his eyes, spoke to those who were about him, and complained of pain in the back of his neck. On the following day he could be considered as in his normal condition.

Uhde, Wagemann, and Boettger, of Braunschweig, report a case of bilateral dislocation of the atlas, in which the right inferior articular process of the atlas was displaced forwards, in front of the corresponding superior articular surface of the axis, and the left inferior articular surface of the atlas backwards, behind the corresponding superior articular surface of the axis, as shown by the position of the left transverse process of the atlas. "The patient, a roofer, fell from a height of thirty feet. The head was rotated upon all three of its axes, the right half of the face being turned forwards, the facial line forming an angle with the median line of the body, and the chin thrown forwards, and the forehead backwards. On the left side there was paralysis of the plexus pharyngeus and the hypoglossal nerve; on the right, simply paralysis of the glosso-pharyngeus. Careful anatomical and experimental research proved that the injuries of the nerves depended upon the dislocation. The nervus accessorius W. also suffered at a point corresponding to that on the hypoglossus, and to this the paralysis of the left velum palati, observed in the patient, was attributed; the plexus pharyngeus, of which the anterior branch of the accessorius forms a part, suffering by traction on the trunk of the nerve. The experiments also proved that, in this dislocation the cord is not subjected to pressure, and that the vertebral artery is not injured. The dislocation was partially reduced two days after the accident by extension, extreme flexion of the head on the left shoulder, and rapid rotation backwards and to the right, together with direct pressure upon the left transverse process of the atlas. The condition of the patient improved materially after extension had been made for some time with Glisson's apparatus. After the lapse of several weeks the patient was able to move his head in every direction. Barely a trace of the paralysis remained."³

¹ Malgaigne, Ehrlich. Malgaigne, op. cit., tom. ii. p. 334.

² Peabody, Boston Med and Surg. Journ., 1876, vol. 2, p. 79.

³ St. Louis Courier of Med., Jan. 1879, from Arch. für Klin. Chirurg., Sept. 1878.

Bernhuber¹ treated a young man who had fallen, striking the back of his neck upon a piece of furniture. He lost consciousness, but when a point opposite the atlas was pressed upon he became convulsed. On the second day the convulsions were continuous, and death seemed imminent. The surgeon seized the head with both of his hands, and made traction upwards, when the patient opened his eyes and became conscious. By means of bandages and a gallows the head was maintained in that position. All symptoms at once disappeared, but it was observed that whenever the extension ceased and the head was permitted to fall upon the trunk, the somnolency was prone to return, and for this reason the extension was continued. The patient recovered, with only a slight rigidity of the neck.

§ 5. Dislocations of the Head upon the Atlas, or Occipito-Atlasian Dislocations.

Lassus, Palletta, and Bouisson² have each reported one example of this dislocation. In neither case was the dislocation complete, but death occurred speedily in every instance. Dariste exhibited to the Anatomical Society of Paris, in 1838, a specimen of incomplete dislocation of the occipito-atlasian articulation, with stretching of the transverse ligament; the patient from whom the specimen was taken having lived more than a year after the accident, when he died from a tubercle in the brain.³

Milner, of London,⁴ has reported a case of complete dislocation of the head upon the atlas. A man, æt. 38, fell from a height of seventy feet, and was killed instantly. On examination it was found that all the ligaments uniting the occiput with the atlas were ruptured, and dislocation was complete. The posterior arch of the atlas was fractured; the spinal marrow, the two arteries, and the two vertebral veins were ruptured.

It is unnecessary to say that only in examples of partial dislocation of the head could a hope be entertained that surgical resources would be of any avail; and even in these cases death has, in all the reported examples, taken place too speedily to permit surgical interference.

CHAPTER V.

DISLOCATIONS OF THE RIBS.

THE ribs may be separated from the bodies of the vertebræ, from the cartilages of the ribs, and from each other. The cartilages of the ribs may also be separated from the sternum.

¹ Bernhuber, Denucé, Art. Région Atlasienne, Nouv. Dic. de Med. et de Chir. Prat., t. 3, p. 809. (Poinsot, op. cit., p. 772.)

² Lassus, Palletta, Bouisson. Malgaigne, op. cit., p. 320.

³ Dariste, Amer. Journ. Med. Sci., Nov. 1838, p. 237, from Archives Gén., May, 1838.

⁴ Milner, St. Barthol. Hosp. Rep., vol. x.

§ 1. Dislocations of the Ribs from the Vertebrae (Vertebro-Costal).

The heads of the ribs are joined to the bodies of the vertebrae by strong ligaments. The articulations are ginglymoid, admitting of motion chiefly in the direction of the axis of the spine. The mobility gradually increases as we proceed from the first rib downwards to the last. Each joint is furnished with a capsule.

The necks and tubercles are also united to the transverse processes by ligaments, and the articulations are furnished with synovial capsules.

I am not aware that any examples have ever been reported of dislocations of the ribs from the transverse processes.

Examples of dislocation of the heads of the ribs have been mentioned by Ambrose Paré, Bransby Cooper, Alcock, Donnic, Henkel, Kennedy, Buttet, and some others; but most of these reputed cases have not borne the test of a critical analysis, and while Vidal (de Cassis) is in doubt whether the claims of even one have been fully established, Boyer denies absolutely its possibility. We see no reason, however, to question the authenticity of several of these examples.

The case mentioned by Bransby Cooper, although very briefly narrated, leaves no room for doubt as to its real character. "Mr. Webster, surgeon to St. Albans, when examining the body of a patient who had died of fever, found the head of the seventh rib thrown upon the front of the corresponding vertebra, and there ankylosed. Upon inquiry, Mr. Webster learned that this gentleman, several years before, had been thrown from his horse across a gate, for which accident he had been subjected to the treatment usually followed in fractures of the ribs, and there is every reason to believe that it was at this time the dislocation occurred."¹

These accidents seem to have been generally occasioned by a fall or a blow upon the back, and the dislocation has been accompanied, usually, with a fracture of some other rib, or of the transverse or spinous processes of the corresponding vertebrae. The head of the rib has always been found to be displaced inwards. The lower ribs, including the false and floating, are those which have been most frequently displaced.

It would be difficult, if not impossible, during the life of the patient, to make a positive diagnosis, since the symptoms resemble so closely those which accompany a fracture of the rib near its posterior extremity. The nature of the accident producing the dislocation, the depression, mobility, and pain, are equally indicative of a fracture; while the failure to detect crepitus might easily be explained by the thickness of the muscular walls at this point, or by the riding, or by other displacements of the broken fragments.

Chelius speaks of a peculiar "rustling," perceived when the body and ribs are moved by the surgeon or by the patient himself, and which is different from the sensation produced by emphysema or fracture.

The treatment ought to be the same which would be adopted in case the rib was broken. Replacement of the dislocated bone must be re-

¹ Webster, B. Cooper's ed. of Sir Astley Cooper, Amer. ed., p. 450.

garded as impossible; and it only remains that we insure quiet as far as possible in this portion of the chest, and combat the pain and inflammation by suitable remedies. The circular bandage, however, recommended in these cases by Sir Astley Cooper, could only be serviceable in dislocations of those ribs which have an attachment to the sternum. The floating ribs, which have been found dislocated quite as often as either of the others, could derive no support from circular pressure, or from any other mechanical contrivance.

§ 2. Dislocations of the Cartilages of the Ribs from the Sternum (Chondro-Sternal).

The cartilage of the first rib has no proper articulation at either extremity, but the remaining six upper ribs, where they join the sternum, are furnished with synovial capsules. In old age these articulations generally disappear, but not always.

Charles Bell observes: "A young man playing the dumb-bells, and throwing his arms behind him, feels something give way on the chest; and one of the cartilages of the ribs has started and stands prominent. To reduce it, we make the patient draw a full inspiration, and with the fingers knead the projecting cartilage into its place. We apply a compress and bandage, but the dislocation is with difficulty retained."

Ravaton, Manzotti, and Monteggia have each, according to Malgaigne, reported one example of traumatic dislocation; in all of which the cartilages were thrown forwards in advance of the sternum.

When treating of fracture of the sternum, I have related one case, which has come under my own observation, of dislocation of three or four cartilages at the same time.

Dr. Samuel D. Flagg, of St. Paul, Minn., relates as follows:

"During the evening of June 29, 1871, a girl, *æt.* 10, while playing with several children, ran violently against the corner of an ordinary deal table. It is stated that the child was faint and breathed with difficulty for a short time, but soon returned to play. No swelling or other evidence of injury was observed by her friends.

"On the 1st of July, about forty-eight hours after receiving the injury, while exercising somewhat violently, she complained of sudden pain at the left costo-sternal articulation and a sensation of something having given way. Soon afterwards I saw the child for the first time, and found a slight non-crepitant swelling at the latter point, and the sternal extremity of the cartilage of the fourth rib displaced forwards, its posterior surface being very nearly on a plane with the anterior surface of the sternum. A minute fragment of bone, unconnected with the sternum or cartilage, was noticed, which I took to be a fragment chipped off from the margin of the articular depression on the edge of the sternum. Neither pain nor embarrassed respiration was notably prominent; crepitus could be detected, but not very distinctly; preternatural mobility was very evident."¹

By pressure alone restoration has generally been effected, the cartilage

¹ Flagg, Northwestern Med. and Surg. Journ., Aug. 1871.

resuming its position suddenly and with a sound. The reduction may, nevertheless, be facilitated by bending the trunk backwards, or by directing the patient to make a full inspiration.

To maintain the reduction has been found more difficult, and Sir Astley directs that "a long piece of wetted pasteboard should be placed in the course of three of the ribs and their cartilages, the injured rib being in the centre; this dries upon the chest, takes the exact form of the parts, prevents motion, and affords the same support as a splint upon a fractured limb. A flannel roller is to be applied over this splint, and a system of depletion pursued, to prevent inflammation of the thoracic viscera." Instead of the pasteboard, we might use either felt, sole-leather, or gutta-percha.

The patients spoken of by Ravaton and Manzotti were both cured in about one month.

Mr. Bransby Cooper says that a baker's boy applied for relief at Guy's Hospital, who was the subject of displacement of the cartilages of the fifth and sixth ribs from their junction with the sternum, produced partly by the constant action of the pectoral muscles in kneading bread, but principally by his defective constitution. Mr. Cooper stated to the boy the necessity of changing his occupation, and advised him to go into the country; but as he was unable to do so, little hope was entertained of his recovery.¹

(The outer extremities of these cartilages being continuous with the bony structure of the rib, and destitute therefore of articular or synovial surfaces, may be subject to fracture, but not, properly speaking, to dislocation.)

§ 3. Dislocations of one Cartilage upon Another.

The cartilages on the sixth, seventh, and eight ribs are furnished at their lower borders with a true arthrodial joint, by which they articulate with the corresponding cartilages. This arrangement sometimes extends to the fifth and ninth ribs.

A displacement of these articulations may take place when one falls upon his back, striking upon some projecting body, so that the chest is suddenly thrown forwards; in consequence of which the upper margin of the lower cartilage is depressed and entangled behind the lower margin of the upper. The inferior cartilage is, therefore, the one which is displaced rather than the superior, although this latter, being made prominent by the pressure of the other from behind, seems alone to be displaced. Boyer, Martin, and Malgaigne² have each reported one example.

It is probable that the contraction of the pectoral and abdominal muscles has a chief agency in the production of these dislocations, and that they are not solely or directly due to the shock of the accident.

The treatment consists in pressing firmly upwards and backwards against the inferior margin of the upper, or overlapping rib, so as to disengage it from the lower, when by its own elasticity it will resume its natural position. The reduction might also be aided by a full inspiration.

¹ B. Cooper's ed. of Sir Astley Cooper, etc., op. cit., p. 447.

² Malgaigne, op. cit., p. 398.

CHAPTER VI.

DISLOCATIONS OF THE CLAVICLE.

OF 57 dislocations of the clavicle observed and recorded by me, 13 belonged to the sternal end and 44 to the acromial. Of those belonging to the sternal end, 11 were dislocations forwards, forwards and upwards, or forwards and downwards, and 2 were upwards. I have never met with a dislocation backwards. Of the acromial dislocations the whole number were dislocations upwards, or upwards and outwards.

§ 1. Sterno-Clavicular.

(a) DISLOCATIONS OF THE STERNAL END OF THE CLAVICLE FORWARDS.

Causes.—This accident is generally caused by a fall upon the point—outer surface—of the shoulder, in consequence of which the sternal end of the clavicle is driven forcibly inwards and forwards. It is probable, also, that the blow which produces the dislocation is received rather upon the anterior and outer than exactly upon the outer face of the shoulder. A sudden effort of the muscles, as in the attempt to balance a weight upon the head, or to throw the shoulders backwards when under drill, has been known also to produce this dislocation. In one example it was occasioned by placing the knee against the spine and drawing the shoulders forcibly back. Various other accidents, the philosophy of whose agency is not so easily explained, are said to have produced the same result; but it is not improbable that in many of these cases the precise manner in which the injury was received has not been correctly understood or reported.

Mr. Fergusson has once seen this displacement in a newly born infant, which had happened during birth. It could be replaced with ease, but immediately slipped out again when left to itself. "Nothing was done; a new joint formed, and the child afterwards possessed as much power in the one arm as in the other;"¹ and Dr. W. C. Shaw, of Pittsburg, Pa., has also seen a congenital case.²

The following is an example of double forward dislocation at the sternal end: Agnes Moriarty, æt. 17, in a collision on the Third Avenue Elevated Railroad, March 25, 1879, was thrown violently, it is supposed, against the door, striking her left shoulder, and then by a rebound striking the floor of the car with the right shoulder. By courtesy of Drs. McGuire and King, her attending surgeons, I saw her on the fourth day after the accident. Exposing her shoulders, we observed an extensive ecchymosis on the outer surface of the right shoulder, extending some distance down

¹ Fergusson, System of Practical Surgery, Amer. ed., 1853, p. 203.

² Shaw, Med. Record, Aug. 18, 1877.