

ATLO-AXOID FRACTURE-DISLOCATION.

BY LEWIS STEPHEN PILCHER, M.D.,

OF BROOKLYN, NEW YORK

As a further contribution to the subject of fracture-dislocations of the first two cervical vertebræ, which has been so ably treated in the preceding paper by Drs. Mixter and Osgood, I desire to place on record the following case which has now been under my personal observation for a period of nearly ten years and therefore fairly represents the possibilities of ultimate repair and restoration of function which may take place in such cases.

The patient, a man 33 years of age, of average good health, and a house painter by occupation, on August 6, 1900, was precipitated headlong from a ladder a distance of 15 feet, striking on his forehead. Immediately thereafter he was able to stand and walk, but was obliged to support his head by his hands. He suffered much pain which was referred to the back of his head and upper part of his neck. He was at once taken to the nearest hospital where he was retained for ten days. During this time, according to his statement, his head was notably bent over towards his left shoulder and was fixed in so great flexion that he could not open his mouth more than half an inch. He had no symptoms other than suboccipital pain and the deformity and stiffening of his neck. Still in this condition, at the end of ten days he left the hospital and returned to his home, where for two months his condition remained unchanged. During this time he was able to walk about his house but did not venture on the street. He then began to be conscious of a growing lack of power in his lower limbs, most marked upon the right side.

During the evening of October 27, 1900, while walking from his chair to the bed, suddenly his knees gave way under him and he would have fallen but for the support of one of the members of his family. He was put to bed and it was discovered that he had no control over his right arm and leg, except that he

could move feebly the fingers of his right hand and the toes of the right foot. He had some control over his left arm, leg and foot, but only to a limited degree. He was unable to urinate, so that regular catheterization had to be instituted. Three days thereafter his right arm and hand had become totally paralyzed. His neck and head, which up to this time had been the seat of much pain, now ceased to trouble him except after some sudden movement.

In this condition, November 7, 1900, three months after the primary injury, he was received into the Methodist Episcopal Hospital of Brooklyn and placed in my service. When received his bladder was still paralyzed, requiring the regular use of the catheter. An acute cystitis had developed. His bowels were constipated but responded to cathartics and enemata. The upper and the lower extremity of the right side were both paralyzed. To faradic stimuli there was no response in the muscles of the right forearm, except in the extensors of the thumb. Flexor profundus digitorum, very weak reaction. Lumbricales and interossei, very weak. Extensors carpi ulnaris and radialis, both very weak. On the arm proper, the biceps and the triceps gave feeble reaction. Deltoid, no reaction. Pectoralis major, feeble reaction. Shoulder muscles, very weak. In the thigh, quadriceps extensor, reaction slight. Posterior flexors of knee, reaction active. Muscles of leg, reaction slight. Diminution of temperature sense over whole right upper extremity. Pain sense absent in both upper and lower extremity. In the left arm and leg the muscular reactions were normal. The head was held in a position of rotation to the left with a curvature of the neck toward the right. No power of flexion or rotation. The outlines of the upper cervical vertebræ were obscured by an abundant dense exudate which was most voluminous on the right side. The spinous process of the axis was slightly twisted to the right of the median line. A finger passed to the back of the pharynx could appreciate a marked concavity in the anterior surface of the spinal column below the second vertebra.

At the end of six weeks' residence in the hospital his condition remained practically unchanged. In view of the possibility that the cord symptoms might in part be due to pressure from a depressed fragment of a lamina, it was decided to expose the axis and atlas. This was done December 19, 1900, through a

vertical incision extending from the occipital protuberance to the level of the seventh cervical spine below. No fracture of any lamina was uncovered, but a forward dislocation of the atlas upon the axis was demonstrated to be present. Careful efforts to correct the displacement were futile. The wound was closed and the head, neck and upper thorax supported in a plaster cuirass. A smooth operative recovery followed. A slight improvement in his paralytic conditions gradually developed during the subsequent weeks. He became able to empty his bladder spontaneously and two months after the operation began to sit up. On June 8, 1901, seven months after the reception at the hospital and ten months after his injury, he asked to be returned to his home. He was still hemiplegic but had normal power over his bladder. During the entire time of his stay in hospital his appetite had always been good and his digestive power fair.

Later History.—A gradual return of power in the paralyzed leg manifested itself after his return home and continued until the normal condition was regained. Improvement also in the right upper extremity took place, but less fully than in the lower extremity.

An examination made of his condition September 2, 1909, nine years after his accident, gives the following: The condition of the head and neck is unchanged as regards deformity and immobility. A dense mass as of organized callus surrounds and obscures the outlines of the atlas and fills the space between the axis and base of the skull, being most voluminous on the right side. The accompanying skiagraphs (Figs. 1, 2, 3) which were taken in August, 1909, by Dr. Charles Eastmond, reveal the outlines of the atlas and axis greatly altered and fused together in an irregular mass. There seems to have been a fracture through the lateral mass of the atlas on the right side with a crush of the body of the axis; the head and atlas with the upper portion of the body of the axis, including the odontoid process, has slipped forward and rotated to the left. He is able to walk normally fairly long distances without much fatigue. No difference of strength between the two lower limbs. He is able to elevate both shoulders, but there is a decided droop of the right shoulder. All the muscles of the right arm and forearm are less developed and weaker than those of the left arm, but all have

FIG. 1.



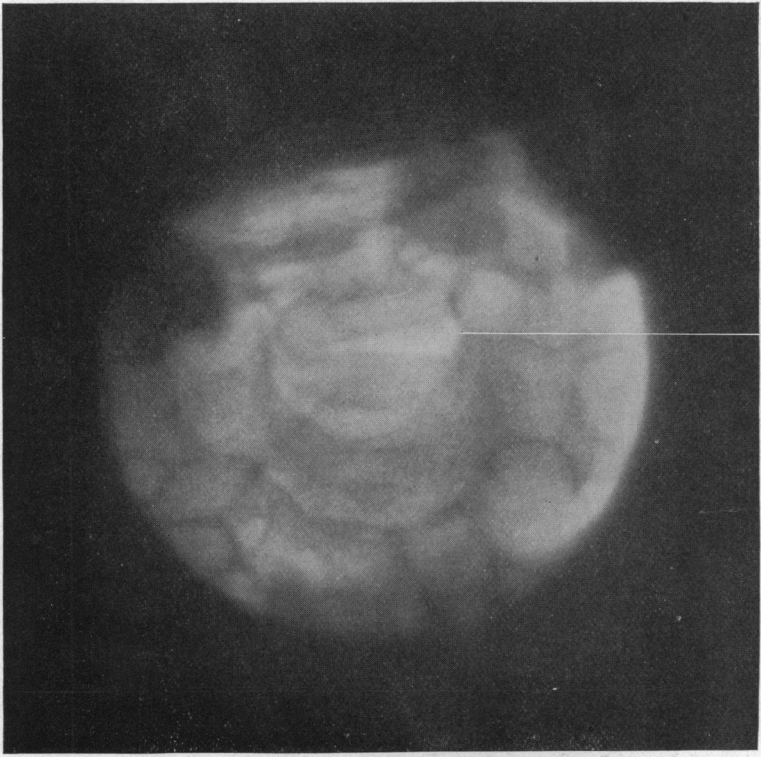
View taken with right side nearest the plate. The atlas is obscured by the tilted and rotated occiput which has brought the mastoid process into the plane of the atlas. The outlines of the axis are rendered hazy by ossified callus.

FIG. 2.



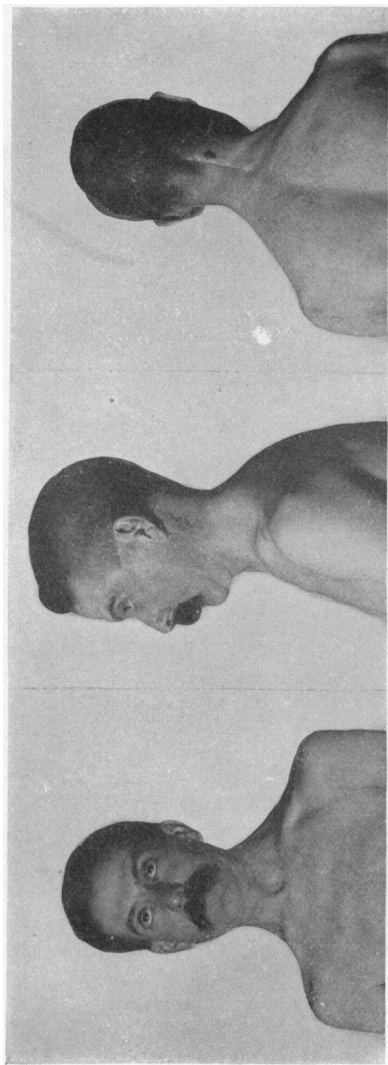
View taken with the left side nearest the plate. The outlines of the atlas are well revealed and the forward displacement of this bone upon the axis is clearly shown; the lateral masses of the atlas and the body of the axis are fused together in an irregular mass, which projects notably in front of the plane of the lower part of the body of the axis, and produces a marked angle whose apex is at the anterior margin of the cartilage between the axis and the third cervical vertebra; irregular lines are perceptible in the fused atlo-axoid mass which suggest former fragmentation of these bones; a mass of ensheathing ossified callus surrounds the lamina of the axis.

FIG. 3.



Anteroposterior view through open mouth. The structure most clearly identifiable is the intervertebral cartilage between the second and third vertebræ, marked *A*.

FIG. 4.



A

B

C

Healed atlo-axoid fracture-dislocation. Note in *A* the rotation of the chin to the left and the bend of the head to the right (reversed in the photograph). Note in *B* the pose in which the head is rigidly held. Note in *C* the scar of operation in the midline of the neck. The dark spot to the right of the upper part of this scar is a dot of iodine placed to mark the location of the spine of the axis.

regained some power; extension and flexion at the elbow is normal in range. Pronation and supination of forearm are normal in range. The right hand presents to a moderate degree the condition of *main en griffe*. The flexor carpi ulnaris and radialis are contracted, as is also the flexor profundus digitorum. Extensor carpi radialis and ulnaris are too weak to overcome the flexors, so that the hand is held in position of flexion with extension of the first row of phalanges and flexion of the two distal rows. The lumbricales and interossei are normal. The muscles of the thumb are normal. He can approximate the thumb and first digit. There is no power to grasp by the hand as a whole. The left lower extremity is normal. The bladder functions are normal. His mentality is unaffected. Appetite and digestion good. Bowels move regularly. His general health is good.

The accompanying photographs (Fig. 4), were taken January 1, 1910, to show the present condition of this man. There is no motion, either of flexion or rotation of the head upon the neck; the bony ankylosis between axis and atlas, and the atlas and occipital bone is apparently complete. The rotation of the head to the left, and the inclination of the head to the right is well shown.