EXTRADURAL SPINAL HEMORRHAGE

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THE INDIVIDUAL SURGEON must have a very limited experience with extradural spinal hemorrhage, for references to it in the literature are hard to find. It is of special significance on account of the fact that in contradistinction to the usual type of injury of the spinal cord with paraplegia, in this particular syndrome prompt recovery of function is to be expected if a proper diagnosis is made and operation is undertaken at the earliest possible moment.

Case Report.—L. R. a 75-year-old white male, was admitted to the Presbyterian Hospital at 9:45 P. M. on February 18, 1943. That afternoon at 3:30 P. M. he fell four or five feet striking upon his buttocks, and after a few moments he got up and walked up 14 steps into the house. A few minutes later, while sitting in a chair, he felt severe pain in the upper part of his back and down both arms; he then walked to the bathroom and took some medicine to relieve the pain and then returned to the chair. The pain was not relieved, and with help he went upstairs to bed. About half an hour after the accident, while lying in bed, he noticed that his legs were getting weak, and after a few more minutes found himself unable to move them. Numbness in the legs, in the abdomen, and in the chest accompanied the weakness in the legs. The arms were also somewhat numb and the strength in them was diminished. He was taken to the Presbyterian Hospital, where he was seen at 10:00 P. M.

On examination, the patient was alert and coöperative, but unable to make any movement with his legs. There was a sensory level on the trunk at the junction of the third and fourth cervical nerves with the third thoracic segment; on the hands there was an uncertain sensory level at the seventh or eighth cervical segment. Muscular power was entirely lost in the legs and in the trunk, but he could move his arms. There was slight weakness of the biceps muscles, and the triceps muscles were much weaker. He was unable to spread the fingers in either hand, in other words, the interossei were paralyzed, but he was able to use the thumb and the flexors of the fingers in both hands with some diminution in strength. The biceps reflex was present bilaterally; neither triceps reflex was obtained. There was urinary retention and a bilateral Babinski sign. The patient had had an arthritis of the spine for many years and there was a deformity of the whole trunk and neck which were bowed stiffly forward. An attempt was made to do a spinal puncture but, owing to the solid arthritis of the spine, it was impossible to enter the spinal canal. The blood pressure on admission was 120/80 mm. Hg.; temperature 100.4° F.; respiration 22; pulse 100.

Operation was decided upon because of the progressive signs. The patient was first taken to the Roentgenologic Department where anteroposterior and lateral views of the cervical spine were taken. There was complete fusion of all the cervical vertebrae, which was regarded as a Marie-Strumple type of arthritis; there was no fracture-dislocation. A diagnosis of fracture dislocation with compression of the spinal cord at the eighth cervical segment was made before the roentgenograms were seen. Massive extrusion of a cervical intervertebral disk was also considered before reading the roentgenograms, but after these were seen (Fig. 1), it was felt that the most likely diagnosis was extradural hemorrhage of the spinal cord.

Operation.—There were numerous difficulties in operating upon this patient because of the ankylosing arthritis of the spine. The head could not be extended which suggested that there would be difficulty in introducing the intratracheal tube. As a matter of fact, in this position this was found to be easy. The sitting position for operations upon

the cervical spine, usually adopted here, was not considered feasible and the patient was placed face down in a cerebellar head rest. A midline incision was made over the spinous processes of sixth and seventh cervical and the first thoracic vertebrae. The spinous processes and laminae were exposed and the laminae of the first thoracic and the seventh cervical vertebrae were removed. As the lamina of the seventh cervical vertebra was removed, there was evidence of an extradural hemorrhage. The laminae of the sixth and the fifth vertebrae were also removed exposing the extradural clot (Fig. 2), which measured approximately 4 x 2 x 1 cm. The clot was lifted out in one piece (Fig. 3).

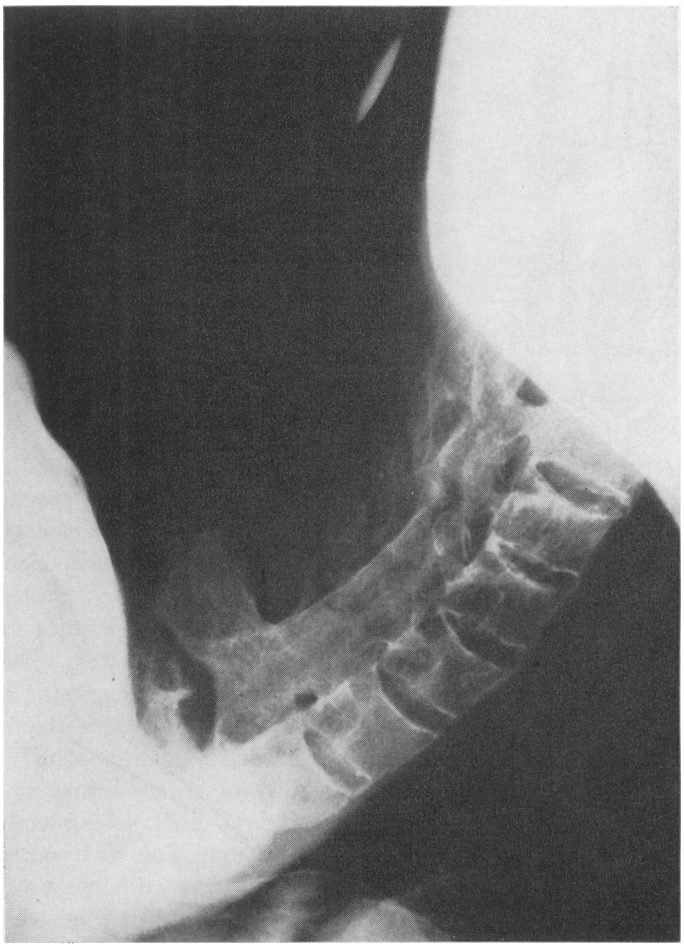

FIG. 1.—Lateral view of the cervical spine showing Marie-Strumpel's type of arthritis, and a coin used as a marker. Lower views revealed no fracture-dislocation.

Following this the dura began to pulsate freely, but there was some bleeding from sclerotic extradural vessels. Muscle was packed in over the bleeding vessels and an iodoform gauze drain was led down to the dura. In this elderly man it was thought to be too time-consuming to stop the bleeding points individually. The wound was closed hurriedly with silkworm gut sutures. An indwelling catheter was inserted immediately after operation.

He was alert and coöperative throughout his convalescence, and there was rapid

improvement in his neurologic condition. By noon of the day following the operation he could make slight voluntary movements of his feet and he could feel the pinprick down to the level of the twelfth thoracic segment. Two days after the operation, the patient could feel the pinprick down to the third lumbar segment, but there was no sensation in the legs below the knee; he had developed more movements in the lower extremities. Three days after the operation, the pinprick was felt over the entire body and movement of the lower extremities was complete, though weak; there were some involuntary twitchings of the left leg. The temperature rose to 103.6° F. in 12 hours following operation but then remained between 101° F. and normal until the seventh postoperative day, after which it remained normal. The blood pressure remained rather low, 100/50 mm. Hg., or so, for the first four postoperative days and then gradually rose to 130/60 mm. Hg., where it remained during his stay in the hospital. The catheter was removed on the fourth postoperative day, but the patient was unable to void; it was reinserted and left in place until two days before he left the hospital on March 8. During the last week in hospital he continued to improve and was up in a chair every day. He was sent home in the care of his family doctor, who stated that after a few days he was gradually able to walk about and, as his strength improved, he resumed his usual occupation.

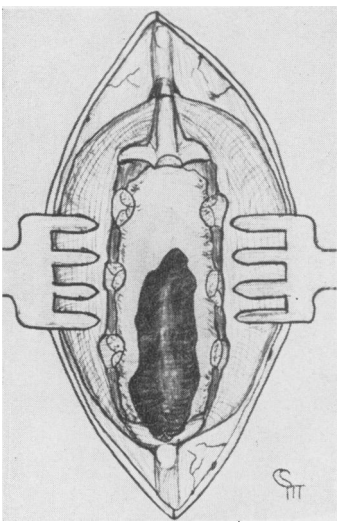

FIG. 2.—Operative sketch by Captain Charles S. Textor II.

COMMENT.—The most important point in the consideration of this case was that of deciding to operate upon the patient immediately. This, in turn, depended on establishing a correct diagnosis, which was strongly suggested by the history. In spinal cord injuries it has always been my practice to wait for spinal shock to pass off before considering operative measures. The freedom, for a time, from paralysis, and then its gradual onset suggested an hemorrhagic type of lesion, which it turned out to be. Before the roentgenograms were taken the possibility of a fracture-dislocation occurring in two stages was considered, as was the possibility of severe injury to the neck, with partial displacement of an intervertebral disk subsequently further displaced by movement, resulting in massive extrusion and compression of the cord. The roentgenograms, however, did away with these possibilities, for it seemed impossible for a dislocation to occur or for a nucleus pulposus to herniate in the ankylosed condition of the cervical spine. The most likely possibility, apart from the hematomyelia, was extradural hemorrhage.

It had been my opinion that the condition, though rare, was occasionally seen, but reference to the literature revealed only a few cases. They are of two kinds: those that occurred "spontaneously" and those that occurred as the result of injury. The word hematorrachis was used to describe some of them. Some of the case reports were difficult to evaluate because of incomplete pathologic or operative reports. For the purpose of this discussion only

those cases of extradural spinal hemorrhage in which the lesion is solely responsible for paraplegia will be considered; there is often both intradural and extradural bleeding in fracture-dislocation of the spine, but these are not the cause of the paraplegia that follows the injury.

The first two cases reported were apparently both "spontaneous" extra-dural hemorrhages, or hematorrachis, as they were called. In 1897, William Bain[1] reported the case of a young housemaid who had suffered for years from constipation. On this particular morning she had great difficulty in moving her bowels. Half an hour later she had severe pain in her back, arms, and legs. She was seen by Bain two hours later, who found that she now had a quadriplegia; she died a respiratory death while he was there. At postmortem examination an extradural clot was found under the second and third cervical vertebrae. Bain specifically stated that all the other organs were healthy and that the rest of the spinal column was normal. The second case was reported by S. D. Hopkins in 1899, who quoted Bain. This was the case of a middle-aged man, who while shoveling coal, suddenly felt a severe pain in his back. There was severe pain down the legs and tingling sensations. In 20 minutes he could not move his legs. Twenty-four hours later some movement returned in the left leg, but he remained incontinent of urine and feces. Four days after this incident he died, and at autopsy an extradural hemorrhage was found in the lumbar region.

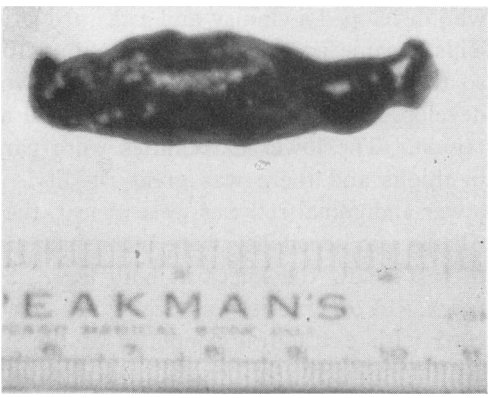

FIG. 3.—Extradural clot removed from under the fifth and sixth cervical laminae.

In 1911, A. F. Jonas,[7] in presenting a paper on spinal fractures before the American Surgical Association, mentioned the case of a 35-year-old farmer, who, ten days before he saw him, had fallen ten feet out of a hay loft. Jonas thought that motor power had been lost immediately and that sensation had been lost gradually over 24 hours. Operation was immediately undertaken (*i.e.*, when seen ten days after the injury), and an extradural clot was found under the fifth and sixth thoracic vertebrae. There is no mention of a fracture-dislocation. The patient recovered function in his legs. It is of interest that Dr. Harvey Cushing was present at this meeting and that he discussed Dr. Jonas' paper at some length.

In 1925, J. Reid and J. Kennedy[9] described the case of a young woman who fell off her bicycle on September 6, 1925. Witnesses stated that this was a very slight injury, actually she was pushed off her bicycle by a car travelling at about five miles per hour. On September 7 and 8 she had pain in the legs and back; on September 9 she walked into the doctor's office;

on September 10 she developed a flaccid paralysis, and on September 11 she died a respiratory death. At postmortem examination an extensive extradural hemorrhage was found from the lumbar region to the third cervical vertebra; there was no fracture-dislocation.

In 1935, Hassin and Stone[5] reported the case of a 32-year-old woman who developed a clumsy and awkward gait two weeks after a normal delivery. This became progressively worse, and the extremities gradually grew rigid, so that the patient frequently fell. Two days after such a fall the patient developed retention of urine and a dull aching pain was felt in the inguinal region. The lower extremities were paralyzed except for some movements in thighs and there was great rigidity. Beevor's sign was present and the lower abdominal reflexes were absent, the upper extremities appeared normal. Changes in sensibility were inconspicuous except for loss of vibration sense to just below the knees in both legs. Spinal puncture revealed a complete block. A diagnosis was made of subacute combined degeneration of the cord with extradural neoplasm at the level of the tenth thoracic segment. At laminectomy, an extradural clot, which resembled a cyst, and which measured 2 x 2 x 1.5 cm., was removed at that segmental level. There was no fracture-dislocation. The patient improved, and at a later date manometric studies showed an absence of spinal block. She died two weeks after operation, with increasing pallor and marked shortness of breath.

In 1941, Wortis and Sharp[10] mentioned extradural hemorrhage in a table in an article entitled "Study of 200 Cases of Spinal Fracture." In this case the hemorrhage was probably not the primary cause of the paraplegia.

Spontaneous extradural hemorrhage causing cord compression is said to occur in hemophilia, and W. M. Priest[8] described such a case in 1935. There was, however, no direct confirmation of this diagnosis either by operation or autopsy. Charles H. Frazier's[4] text book on "Spinal Cord Surgery" contains only a reference to Jonas,[7] and Elsberg's[3] book does not refer to this syndrome at all. It is mentioned as an entity in Osler's Modern Medicine, 1928, in the chapter written by Sir F. Farquhar Buzzard and C. P. Symonds,[2] but no case is quoted, nor is a reference given.

In considering the etiology of these eight cases available in the literature, those of Bain[1] and of Hopkins,[6] and that of W. M. Priest[8] are of the so-called spontaneous variety. Priest's case is too poorly documented to be of value. In the case tabulated by Wortis and Sharp[10] the extradural hemorrhage was probably only an incidental finding. Trauma may have been of etiologic significance in the case reported by Reid and Kennedy,[9] and in the case described by Hassin and Stone.[5] Jonas' case was certainly secondary to trauma, although the title "Spinal Fractures" is misleading for no fracture was demonstrated in this instance.

The example of extradural spinal hemorrhage reported here did not have a fractured spine and it was improbable that fracture-dislocation could have occurred because of the diffuse ankylosis of the spine. Further, in the two

cases pertinent to this discussion, that of Jonas and that of Reid and Kennedy, a fracture-dislocation of the spine was not found.

Following indirect trauma to the spine, the short progressive history, with the gradual onset of paraplegia in a few minutes or a few hours, and the absence of a bony lesion should strongly suggest extradural hemorrhage of the spinal cord. At all events immediate operation should be performed at the site indicated by the motor and sensory level. A case of extradural spinal hemorrhage is reported in which early operation and removal of the clot was followed by recovery.

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