THE SYNDROME OF ACUTE CENTRAL CERVICAL SPINAL CORD INJURY
WITH SPECIAL REFERENCE TO THE MECHANISMS INVOLVED IN HYPEREXTENSION INJURIES OF CERVICAL SPINE*

RICHARD C. SCHneider, M.D., GLENN CHERRY, M.D.,† AND HENRY PANTEK, M.S.E. (EE)
University of Michigan Hospital and Medical School, Ann Arbor, Michigan
(Received for publication July 26, 1954)

In acute cervical spinal cord injuries, there is a syndrome that suggests central cervical spinal cord involvement. It is characterized by disproportionately more motor impairment of the upper than of the lower extremities, bladder dysfunction, usually urinary retention, and varying degrees of sensory loss below the level of the lesion. If the findings are caused by central cord destruction with bleeding, hematomyelia, there may be caudad or cephalad extension of the lesion with further progression of symptoms, perhaps culminating in complete tetraplegia or death. But if the symptoms are caused by concussion or contusion, with an edematous type of central cord involvement, there may be gradual return of function in a definite sequence. The amount of recovery depends on the degree of edema present compared to the extent of hematomyelia. The lower extremities tend to recover motor power first, bladder function returns next, and finally strength in the upper extremities reappears, with the finer finger movements coming back last. The varying degrees of sensory impairment do not follow any set pattern of recovery.

The syndrome of acute central cervical spinal cord injury occurs most frequently in severe hyperextension injuries which cause a simultaneous squeezing or pinching of the spinal cord both anteriorly and posteriorly. This may occur without apparent damage to the bony spine, having been caused by an inward bulge of the ligamentum flavum during hyperextension. A hyperextension injury of the cervical spine may be suspected when a history is elicited of the patient having fallen forward on his face, or if, on examination, contusions and lacerations are found on the face or forehead. However, this syndrome also may be associated with cervical arthritis, certain cervical compression fractures, and special types of hyperextension or flexion fracture-dislocations of the cervical spine.

Recognition of the syndrome is important, for the authors believe that it may imply a fairly good prognosis. Surgical decompression of the spinal cord is contraindicated because spontaneous improvement or complete re-

* Presented at the meeting of the Harvey Cushing Society, Santa Fe, New Mexico, May 6, 1954.
† 909 Medical Arts Bldg., Dallas, Texas.
covery may occur. Furthermore, operation has actually been known to harm these patients rather than improve them.

This is a preliminary report which does not present all the experimental and pathological material that would be necessary to confirm our theories, but it serves as a foundation for building up further proof.

This symptom complex is not a rare one, but it has been incorrectly designated as hematomyelia by various observers for many years. By definition, bleeding into the cord, or hematomyelia, must necessarily be associated with some degree of destruction of cord substance, and therefore some residual neurological deficit might be anticipated. Since complete recovery has occurred in some of these patients, we must assume that there was primarily extensive cord swelling or edema with little or no permanent cord damage. The designation "acute central cervical cord injury" therefore is all inclusive and more accurate. In reviewing the literature, we have found reports of 6 cases with similar symptoms.

In his 1887 paper, Thorburn reported the following case:

Case I. A 40-year-old patient was admitted to the hospital on Aug. 15, 1885, suffering from the results of a 50-foot fall. There was a contusion with a 4-inch laceration on the right side of the forehead. The patient was not unconscious.

All four limbs were "paralyzed," the arms completely so, but the legs could be moved in bed. There was complete anesthesia of the trunk and all four extremities with loss of control of bladder and rectum.

On August 17, the lower extremities moved very readily, but the arms remained immobile. Sensation improved. By August 18, the arms and fingers recovered motor power, and on October 12, the patient was first able to walk. Five months after the accident, he returned to work. There was a residual tingling in his fingers and a sensation of constriction about his abdomen. However, there was no diminution in motor power. The patellar and Achilles reflexes were exaggerated.

Our Comment. We believe that this patient sustained a direct facial impact which resulted in hyperextension of the cervical spine and the acute central cervical cord injury syndrome. Recovery followed the routine pattern described above.

Minor, as cited by Marty, presented a case of "central hematomyelia."

Case II. A 30-year-old peasant was thrown forward from a height of 3 meters, struck the ground, and lost consciousness for an hour. On recovering his senses he could not move his arms or legs. There was pain in the cervical area and in the upper extremities.

No contusion or luxation of the cervical spinal column was observed. There was marked motor impairment in the upper extremities with less in the left leg and only minimal paresis in the right leg. No increased tonus was found in the lower extremities. The patellar reflexes were hyperactive. Touch was preserved over the entire body. An area of analgesia began at the groin and extended along the right side, being more marked in the right leg and extending to T10 anteriorly and the tip of the scapula posteriorly. Apparently there was a complete loss of temperature sensation.

Two months later the patient was notably stronger in all extremities, and was able to stand with difficulty. His patellar reflexes were hyperactive. Pain and tem-