Cruciate paralysis

Case report

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A rare case of cruciate paralysis is reported in a 39-year-old man following a motor-vehicle accident. The differentiation of this syndrome from a central cervical spinal cord injury is delineated.

KEY WORDS - cruciate paralysis - central cord syndrome - pyramidal decussation - medullocervical junction

The corticospinal tract may be impaired at any point during its course through the brain stem and spinal cord. The complex somatotopic organization of the pyramidal fibers is such that two different lesions may produce comparable symptoms. A cervical central cord syndrome may appear clinically similar to a focal lesion of the rostral, ventral, and medial decussating pyramidal fibers.

The precise localization of a lesion involving the central nervous system is vital. According to Bing, "A lesion interrupting the corticobulbar and corticospinal tracts also involves one or more of the cranial nerve nuclei. The level of the lesion in the brain stem is indicated by the cranial nerve nuclei affected. The nuclei need not be directly damaged by the lesion, but may, instead, be compromised indirectly through pressure or circulatory disturbance induced by the lesion."

A rare case of bilateral upper-extremity paralysis associated with specific cranial nerve dysfunction is reported. To our knowledge only five similar cases have been reported in the literature.

Case Report

This 39-year-old man sustained a deceleration motor-vehicle injury with loss of consciousness on May 3, 1985.

Examination. Immediately after the accident, he was unresponsive. He had bilateral flaccid upper-extremity paralysis and a flexor withdrawal response of the lower extremities. Ventilation was initially spontaneous; however, artificial respiration soon became necessary. Bulbocavernosus, cremasteric, corneal, and abdominal reflexes were present. Trace patellar and Achilles reflexes were noted. Hoffmann's sign was absent and the toes were downgoing on plantar reflex stimulation of the feet.

A computerized tomography scan of the upper cervical spine and brain was obtained. The only abnormality noted was a small hypodense fluid collection in the right frontoparietal region. No lesion involving the bones of the upper cervical spine, mandible, or cranium was demonstrated. Standard cervical spine films and tomograms demonstrated normal bone alignment and no prevertebral soft-tissue swelling. The odontoid process was within normal limits as measured by Chamberlain's and McGregor's lines. The basal angle was 130°, with no evidence of platybasia.

Course. The patient regained consciousness within 90 minutes of the accident. During examination, he was oriented to person, place, and time. An absent gag reflex, inability to swallow, and only minimal movement of the tongue were demonstrated. The patient also had difficulty in shrugging his shoulders and turning his head. These physical findings indicated impairment of the ninth through 12th cranial nerves. There was no evidence of the trigeminal sensory onion-skin pattern of Déjerine. Anterior, lateral, and posterior column sensory modalities were normal. Voluntary movement was absent in the upper extremities; however, antigravity strength was present in all lower-extremity musculature.
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By June 2, the patient no longer required mechanical ventilation, and artificial respiration was withdrawn. Within hours, reintubation was necessary to mobilize secretions. Four days later, a tracheostomy was performed to manage excess secretions secondary to the patient's inability to swallow. A nasogastric feeding tube was also required for nutritional support. At this time, the triceps demonstrated only a trace grade of strength while the lower extremities were normal. Lateral cervical spine films with flexion and extension views were normal, and the atlantoaxial region was without fracture or dislocation.

By June 13, the patient was completely ambulatory yet had regained only a trace grade of strength in the upper extremities. An additional 3 weeks was required for him to achieve a fair grade of strength in his arms. During this time, he demonstrated voluntary control of tongue musculature. A gag reflex was unobtainable. A feeding jejunostomy was required for long-term nutritional support. Ten days later, he regained his ability to swallow. The tracheostomy tube was removed on July 9, and, on July 14, a gag reflex was present. The following day, the patient met 100% of his caloric needs orally, and had only minor swallowing difficulties with clear liquids. On July 20, the jejunostomy tube was removed.

Within 10 days, the patient was riding a stationary bicycle 6 miles, climbing stairs, and jogging. He was capable of feeding himself, but required moderate assistance with dressing. The patient's hand strength had progressed from an initial gross grasp of 0 lb bilaterally to 20 lb on the right and 30 lb on the left. A positive bilateral Hoffmann's sign was noted on August 8, but the toes were still downgoing with plantar stimulation. The patient was discharged home the next day. He was independent in all activities of daily living and had a fair grade of strength in both upper extremities.

Discussion

In 1970, Bell described a syndrome characterized by preferential weakness of the upper extremities compared to the lower extremities, and later defined it by the term "cruciate paralysis." The proposed area of injury included mainly the cephalad fibers of the pyramidal decussation supplying the upper extremities. This is in contradistinction to the central cord syndrome first described by Schneider, et al., which may present clinically similar symptoms.

Anatomically, the pyramidal decussation extends over a longitudinal distance spanning the medullocervical junction to the C-2 level. The motor tract of the upper extremities crosses ventral and rostral to the fibers supplying the lower extremities between the medulla and the C-1 region (Fig. 1). The uncrossed lower-extremity fibers lie lateral and dorsal, making them less susceptible to superficial compression. The lower-extremity fibers decussate between the C-1 and C-2

FIG. 1. Drawing of the medullocervical junction showing the longitudinal expanse of the pyramidal decussation in reference to associated brain-stem structures. The ventral and medial arm fibers decussate rostral to the leg fibers. Characteristic spinal cord lamination of the arm and leg fibers is reached at the C-2 level.
regions. The characteristic laminization of the medial arm and lateral leg fibers is seen at the C-2 level (Fig. 1).

As the findings indicate, a superficial lesion strategically placed at the medullocervical junction can cause preferential upper-extremity paralysis with cranial nerve dysfunction and relative sparing of the lower extremities (Fig. 1). The central cord syndrome occurring in the cervical region can present in a similar manner, but the cranial nerves should remain unaffected.

We believe our case represents an example of cruciate paralysis and not a central cord syndrome. A lesion affecting the proximal portion of the pyramidal decussation may also affect associated brain-stem structures (Fig. 1); in our patient, the function subserved by the ninth through 12th cranial nerves was temporarily affected. Upper-extremity function continued to be suboptimal at discharge, whereas return of lower-extremity function was complete within days of the initial incident. A central cord syndrome in the upper cervical region should not impede the patient’s ability to swallow, phonate, or manipulate the tongue. We believe that a diagnosis of cruciate paralysis should be considered when upper-extremity paralysis occurs with some initial lower-extremity paresis associated with brain-stem dysfunction.

References