Complete fracture-dislocation of cervical spine without permanent neurological sequelae

Case report

ROY P. BAKER, M.D., AND ROBERT L. GRUBB, JR., M.D.

Department of Neurology and Neurological Surgery, Washington University School of Medicine, St. Louis, Missouri

A case of complete fracture-dislocation of the lower cervical spine in which there were no permanent neurological sequelae is presented. The absence of permanent neurological deficits with this type of injury is rare. The primary mechanism of injury in this patient was believed to be hyperextension with rupture of the ligamentous structures, allowing complete dislocation of the C-6 body while the posterior elements remained in good alignment due to multiple fractures which "decompressed" the spinal cord.

KEY WORDS cervical spine • fracture-dislocation injury • skeletal traction • computerized tomography

A fracture-dislocation of the lower cervical spine in which the body of one vertebra lies entirely anterior to the adjacent body is unusual, and is generally accompanied by severe spinal cord injury. Lack of any permanent neurological deficit is very rare with this type of injury, and few such cases have been reported. We present a patient with a complete fracture-dislocation of C-6 on C-7 who sustained no permanent neurological deficit. The radiological findings, the treatment of the patient, and the proposed mechanism of injury are discussed.

Case Report

This 59-year-old man was involved in a single-vehicle accident on the morning of admission. He was able to get out of the car and crawl up a steep embankment to get help. His chief complaint was severe neck pain.

Examination. Evaluation on admission to the hospital revealed marked cervical muscle spasm and multiple abrasions and contusions of the forehead, face, and extremities. He was mildly lethargic and disoriented to place and time, but his speech was clear and his cranial nerves were intact. Motor examination was unremarkable except for minimal right triceps weakness. There was no sensory deficit. Deep tendon reflexes were normal except for a slightly decreased right triceps reflex.

Cervical spine films showed the body of C-6 to be completely dislocated and lying anteriorly to the body of C-7. There were suspected bilateral fractures of the lateral masses and laminae of C-4, C-5, and C-6, but the posterior elements of the cervical spine remained in satisfactory alignment (Fig. 1).

Course. Skeletal traction with Crutchfield tongs was applied. No reduction occurred with 5 lb and then 10 lb of traction. Careful manual traction under fluoroscopic control was then performed, but the dislocation could be only partially reduced. The body of C-6 remained dislocated approximately 70% with respect to the body of C-7. Further attempts at reducing the fracture-dislocation were abandoned, for fear of creating neurological deficits.

Computerized tomography (CT) of the cervical spine revealed the following findings: bilateral fractures were present at the junction of the pedicle and pars interarticularis of C-4; the lamina and pars interarticularis of C-5 were fractured bilaterally; there was a small fracture of the body of C-5 posteriorly; both the pedicles of C-6 were fractured; and C-7 was intact except for a fracture of the anterior part of the body. The diameter of the canal was found to be enlarged at the C-5 and C-6 levels in both anteroposterior
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and transverse dimensions (Fig. 2), and there was no compromise of the spinal canal at C-7. There were no bone fragments noted in the cervical spinal canal.

With the knowledge that the cervical spinal canal was not compromised by any fracture fragments and was actually enlarged at the C-5 and C-6 levels, more vigorous manipulation under fluoroscopic control was performed. This consisted of careful manual traction with some flexion, then gentle extension to reduce the dislocation. During manipulation and reduction of the cervical spine dislocation, the patient's neurological status remained stable. Skeletal traction was continued with 7 lb weight. Over a period of several days, his mild neurological deficits resolved completely. On the 18th day following injury, he was removed from skeletal traction, placed in a Halo jacket for immobilization, and ambulation was begun.

Follow-Up Examination. The Halo jacket was removed after 6 months. Cervical spine films at this time showed evidence of solid fusion of the fractures (Fig. 3), and flexion-extension films revealed limitation of movement of the patient's neck but no instability. Two years after his injury, his cervical spine remains in good alignment and his neurological examination is normal.

Discussion

It is our opinion that the primary mechanism of injury to the cervical spine in our patient was hyperextension, especially with the obvious injuries to his forehead and face. Forsyth suggested that severe hyperextension results in shear loading at the site of dislocation, causing rupture of the anterior longitudinal ligament, separation of the intervertebral disc at the vertebral end-plates, separation of the posterior longitudinal ligament from the vertebral body, and fracture of the facets. Hyperextension is known to cause posterior element fractures also. We believe that in our patient the rupture of the ligamentous structures allowed the C-6 body to be dislocated, but the posterior elements remained in good alignment because of the multiple fractures, thereby "decompressing" the spinal canal. Pitman, et al., in discussing a case of complete fracture-dislocation of C-6 on C-7 with incomplete neurological deficits, believed that a similar mechanism of severe hyper-
extension injury had accounted for the radiological findings they observed. Their patient had recovery of motor weakness, but residual sensory deficits remained. Bailey\(^1\) presented a case of complete dislocation of C-5 on C-6. This patient had immediate quadriplegia, but did not seek treatment for 6 weeks. Attempts at closed reduction of the fracture-dislocation were unsuccessful, and open reduction was not attempted for fear of increasing existing neurological deficits. The patient had only partial improvement of the quadriplegia.

After initial efforts to reduce the fracture-dislocation in our patient failed, we believed that further attempts at closed reduction were best made by careful manual traction under fluoroscopic control. Because of the severity of the fractures involving both the anterior and posterior elements, it was feared that the addition of increasing amounts of weight to the skeletal traction carried considerable risk of distraction of the injured area with resultant spinal cord damage.

The value of CT scanning in the early management of cervical spine fractures is demonstrated in this case. The specific fractures of the posterior spinal elements, which were difficult to define on the plain cervical spine films, were clearly delineated on the CT scan. In addition, the CT scan revealed that the lower cervical spinal canal diameter was actually enlarged, and no bone fragments were inside the spinal canal after partial reduction of the fracture-dislocation. This knowledge allowed us to be more aggressive in manipulating the cervical spine to achieve better alignment without resultant spinal cord damage.

Because of the extensive fractures at multiple levels of the lower cervical spine, it was considered that primary operative fusion was not indicated. Immobilization in the Halo cast resulted in bone fusion and stabilization of the spine, obviating the need for any secondary surgical fusion.

References