ATLANTO-AXIAL DISLOCATION WITHOUT FRACTURE

CASE REPORT OF AN EJECTION INJURY

NORBERT BOOS, RABI KHAZIM, ROBERT W. KERSLAKE, JOHN K. WEBB, HOSSEIN MEHDIAN

From Queens Medical Centre, Nottingham, England

We describe an unusual injury to the upper cervical spine sustained during ejection from an aircraft. MRI provided an accurate and direct diagnosis of the severe ligamentous injuries.

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Ligamentous injuries to the atlanto-axial joint complex without dens fracture or rotation are very rare; few cases have been reported.\(^1\)-\(^3\) The diagnosis of this injury has previously been based on indirect assessment by conventional radiography.\(^3\) We report a case of atlanto-axial dislocation resulting from ejection from an aircraft in which the ligamentous injuries were directly documented by MRI and CT.

Case report. A 36-year-old navigator ejected from an aircraft after a mid-air collision. On admission the patient had a Glasgow coma scale (GCS) of 10/15 which was deteriorating before he was intubated. The initial diagnoses were left frontal brain contusion, right haemothorax and multiple rib fractures. Conventional radiographs showed a widened atlantodental interval (Fig. 1). Further investigation by CT and MRI (Figs 2 and 3) showed atlanto-axial dislocation with avulsion of the transverse ligament and gross posterior soft-tissue disruption. There were no abnormalities of the brainstem or cervical spinal cord. The C1/C2 dislocation was reduced by halo traction but on reversal of sedation, a detailed neurological examination revealed bilateral third, fourth and sixth cranial nerve deficits. Motor power was reduced in both arms (MRC grade 0-1 for

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1. Boos, MD, Spine Fellow, Orthopaedic Surgeon
2. Khazim, MD, FRCS C, Spine Fellow, Orthopaedic Surgeon
3. W. Kerslake, MRCP, FRCR, Consultant Spinal Radiologist
4. J. K. Webb, FRCS, Consultant Spine Surgeon
5. Mehdian, MD, MS Orth, Consultant Spine Surgeon

Correspondence should be sent to Dr. N. Boos at the Orthopaedic University Hospital Balgrist, Forchstrasse 340, CH-8008 Zürich, Switzerland.

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biceps, wrist extensors and triceps, and grade 1-2 for intrinsic hand muscles) and was more severe on the left. There was motor weakness to grade 3-4 in both legs with upper motor neurone signs including hyper-reflexia and positive Babinski signs. The patient had a severe burning sensation with hyperaesthesia in his left arm but no other sensory deficits. At a later stage a left brachial plexus injury was diagnosed by electromyography.

The patient was treated by C1/C2 transarticular screw fixation and a modified Gallie fusion without complications. At six months after operation, he had complete recovery of motor power in the right arm and both legs with persistence of a significant motor deficit in the left arm to MRC grade 1-2.

DISCUSSION

This case has several interesting features. Although vertebral compression fractures are well recognised and relatively common (4% to 31%) after ejection from an aircraft, severe injuries of the cervical spine with neurological deficits are very uncommon.4,5 In our patient, the complex neurological deficit suggested a traction injury to the cranial nerves, spinal cord and brachial plexus. A concomitant ‘cruciate paralysis’6 could explain the predominance of motor weakness in the upper limb with relative sparing of the legs, which fits topographically with an atlanto-axial dislocation. Excessive forces on the flexed head transmitted through the helmet during ejection may have resulted in this injury; this view is supported by the MRI finding of massive disruption of the posterior soft-tissue structures, which suggests forceful hyperflexion as the predominant mechanism of injury. This has not been previously described in conjunction with atlanto-axial dislocation.

Until recently, rupture of the transverse ligament allowing anterior atlanto-axial dislocation without fracture could be diagnosed only indirectly from radiographs showing an atlantodental interval of 5 mm or more.2 These radiographic measurements may be misleading because they depend on head position; flexion/extension views are not advisable in a patient with an acute neurological injury.3 Dickman et al7 first reported that such ligamentous injuries can be directly seen on MRI. In our case, CT and MRI showed avulsion of the transverse ligament from its insertion on the lateral mass of C1 with associated posterior soft-tissue disruption. Although the possibility of injury to the alar ligaments has been suggested by Willauschus et al,8 we could not demonstrate this.

Our report shows the potential of MRI in directly depicting the ligamentous and soft-tissue injuries in atlanto-axial dislocation without fracture. This can make indirect radiographic assessment unnecessary and assist in the analysis of the mechanism of injury.

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REFERENCES