Case report

Unreduced atlantoaxial dislocation locked with a combined lateral mass fracture

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Introduction

Traumatic bilateral rotatory subluxation of the atlantoaxial joints is a rare injury, and reduction is generally achieved spontaneously and with ease by traction therapy. On the other hand, the pathophysiology of rotatory atlantoaxial subluxation is not well defined, but it is common in children and is a consequence of specific anatomical features. The joint surface of the lateral mass is shallower and more horizontally oriented in children, and the relative elasticity of ligaments allows a greater degree of deformity before failure. However, traumatic atlantoaxial rotatory subluxation in adults is rare owing to the unique biomechanical features of the C1/2 articulation and the likely lethality of such an injury before presentation at a trauma center. Atlantoaxial bilateral rotatory dislocation is uncommon, particularly in adults, and most of the reported cases have been in adults who have undergone surgery. To our knowledge, nonoperative management has been reported in only two such adult cases, and in both reduction was achieved by simple manipulation (Table 1).

The authors report a case of type I traumatic rotatory atlantoaxial injury in which complete reduction was successfully achieved using closed maneuvers after failure to achieve reduction by closed traction due to locking of the dislocated atlas by a combined lateral mass fracture of the axis.

Case report

A 58-year-old man was referred to our trauma center with severe neck pain after being involved in an automobile accident at unknown speed. He was an unrestrained passenger in a car that had overturned, and he had lost consciousness briefly (a matter of seconds) after the injury.

On physical examination, he showed no appreciable neurological distortion of the upper or lower extremities (e.g., motor weakness or sensory deficit), and his cranial nerves were intact. However, his head was fixed and rotated to the left side by about 40°, and he showed a 20° lateral inclination to the same side.

Plain radiography suggested the presence of a significant rotational deformity of the atlas on the axis (Fig. 1). Cervical spine computed tomography (CT) with three-dimensional reformations and magnetic resonance imaging (MRI) scans were checked but showed no appreciable increase in the atlanto-dens interval (ADI). However, the inferior lateral mass of the right atlas was dislocated anteriorly to the superolateral mass of the axis on the same side and was locked by a combined fracture of the superior lateral mass of the axis (Fig. 2). There was no radiographic evidence of rupture of the transverse ligament (Fig. 2C).

To achieve reduction, Gardner-Wells tongs skull traction was applied after admission. We started by increasing the traction weight to 7 kg and then increased it incrementally to 20 kg while carefully observing the patient’s reaction and checking for any neurological change. The traction was kept in place for 7 days, but reduction could not be achieved. Although muscle relaxants and analgesics were given, the anterior and posterior neck muscles showed consistent tension and intermittent spasms. We believed that this tension prevented reduction. Thus, anticipating reduction due to the relaxation of neck muscle tension, we tried closed reduction of the longitudinal axis of the atlantoaxial joint using weight and manual traction under general anesthesia. Once again, however, reduction could not be achieved.

Subsequently, we achieved reduction by the method planned before under the same anesthesia. First, we...
Table 1. Cases of atlantoaxial dislocation in adults reported in the literature

<table>
<thead>
<tr>
<th>Reference</th>
<th>Age (years)</th>
<th>Sex</th>
<th>Classification</th>
<th>Dislocation</th>
<th>Diagnostic method</th>
<th>Traction period</th>
<th>Definitive treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born</td>
<td>29</td>
<td>M</td>
<td>I</td>
<td>Bilateral</td>
<td>CT</td>
<td>Immediate reduction</td>
<td>Minerva orthosis for 2 months</td>
</tr>
<tr>
<td>Moore</td>
<td>65</td>
<td>M</td>
<td>I</td>
<td>Bilateral</td>
<td>CT</td>
<td>Reduction within 24 h</td>
<td>C1/2 posterior wiring and fusion</td>
</tr>
<tr>
<td>Waegeneers</td>
<td>17</td>
<td>M</td>
<td>I</td>
<td>Unilateral</td>
<td>CT</td>
<td>4 days</td>
<td>Halo vest for 3 months</td>
</tr>
<tr>
<td>Castel</td>
<td>41</td>
<td>M</td>
<td>I</td>
<td>Bilateral</td>
<td>CT</td>
<td>10 days</td>
<td>Minerva orthosis for 6 weeks</td>
</tr>
<tr>
<td>Kim†</td>
<td>34</td>
<td>M</td>
<td>II</td>
<td>Unilateral</td>
<td>CT, MRI</td>
<td>24 h</td>
<td>Open reduction, posterior instrumented fusion</td>
</tr>
</tbody>
</table>

CT, computed tomography; MRI, magnetic resonance imaging

Fig. 1. Posttraumatic anteroposterior (AP) and lateral plain radiographs of the patient. a The head was fixed and rotated to the left side. b A significant rotational deformity of the atlas about the axis is evident, and it shows no appreciable increase in the atlanto-dens interval (arrow)

Fig. 2. a Computed tomography (CT) with three-dimensional reformations. The inferior articular facet of the right atlas was dislocated anterior to the superior facet of the axis on the same side. b CT axial view shows that the dislocated inferior articular facet of the atlas was locked by a combined fracture of the superior articular facet of the axis. c Magnetic resonance imaging, T2-weighted axial view. The transverse ligament (arrow) was intact