DIAGNOSIS OF ACUTE ATLANTO-AXIAL ROTATORY FIXATION

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We report three cases of atlanto-axial rotatory fixation in adults. Early diagnosis was made by clinical tests showing restricted head rotation in maximal neck flexion and asymmetry of the transverse processes of the atlas, confirmed by cineradiography. Early treatment by traction may obviate long-term problems of torticollis and instability.

Acute rotatory fixation of the atlanto-axial joint with less than 3 mm of anterior displacement of the atlas has not, as far as we know, been reported before in adults. This is Type 1 in the Fielding and Hawkins classification, characterised by fixed rotational subluxation without ligament damage. We present three patients in whom the diagnosis was suspected clinically and confirmed by cineradiography.

Early recognition and treatment of the rotatory fixation prevents subsequent deformity and instability (Johnson and Fergusson 1986). Fielding and Hawkins (1977) mention that persistent clinical deformity including torticollis and painful restricted neck movement are features of undiagnosed atlanto-axial rotatory fixation. Atlanto-axial stability is compromised and even a minor injury to the neck can cause neurological problems.

Clinical features. The usual picture of rotatory fixation is the "Cock Robin" position (lateral flexion to one side, rotation toward the opposite side and slight flexion like a robin listening for a worm). The atlanto-axial joint is fixed in full rotation, but in the acute stage there is no muscle spasm. Later there is spasm of the sternomastoid on the side opposite to the direction of rotation, an attempt to correct the deformity. This important finding differentiates rotatory fixation from spasmodic torticollis; in the latter condition the shortened sternomastoid is the deforming force (Fielding and Hawkins 1977). The deformity of rotatory fixation can be slightly increased by manipulation but cannot be corrected to the neutral position.

Neurological findings are unusual, but sometimes there is irritation of the greater occipital nerve, as in our

Fig. 1

Case 1 – Open mouth view showing asymmetrical atlanto-dental intervals and subluxation of the right atlanto-axial joint. Flexion-extension views were normal; the diagnosis was confirmed by cineradiography.

first two cases. This nerve emerges between C1 and C2 and may be the source of some occipital pain.

All patients have restricted head rotation when the neck is in maximal flexion. Normally, about 50% of rotation of the head and cervical spine occurs at the atlanto-axial joints and 50% at the subaxial joints; maximal flexion of the lower cervical spine prevents rotation at this level so that movement and restriction at the C1-C2 level are more obvious. The amount of fixed rotation at C1-C2 may sometimes affect the vertebral artery and cause vertigo, nausea, tinnitus or visual disturbances.

A subtle test of rotatory fixation is performed by palpating the transverse processes of the atlas just below the mastoid processes with the index fingers, while placing the thumbs on the sides of the spinous process of the axis. When the head is rotated asymmetry or even absence of a transverse process can be detected.

Radiological findings. The diagnosis of rotatory fixation is confirmed by open mouth views taken in the neutral position and with 15° of rotation to each side. These films show a persistently asymmetrical relationship of the dens to the articular masses of the atlas. Because of the technical difficulties of obtaining these views (Wortzman and Dewar 1968) we prefer the use of cineradiography in the lateral position; the posterior arches of the atlas and the axis are seen to move as one unit during neck rotation. Flexion-extension views will rule out any anteroposterior displacement (Types 2, 3 and 4 in the Fielding and Hawkins classification). Tomography and

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Fig. 2

Case 2 - Anteroposterior radiograph suggesting rotatory fixation with a lateral displacement of more than 4 mm.

Fig. 3

Case 3 - Open mouth view showing asymmetrical atlanto-dental intervals with subluxation. One lateral mass which is rotated forward appears to be wider and closer to the midline, whereas the opposite mass appears to be narrower and farther from the midline (Wortzman and Dewar 1968).

CT scanning may be used to confirm the rotatory fixation and to exclude fractures of the atlas and axis. Lateral displacement of the dens by more than 4 mm suggests atlanto-axial rotatory fixation (Werne 1957) but this should be confirmed by cineradiography.

CASE REPORTS

Case 1. A 48-year-old man who had been punched, was admitted with torticollis and pain in the upper neck, radiating to the occiput, eyes and forehead. Neck rotation to the right was impossible, and there was lateral flexion to the right. The left sternocleidomastoid was in spasm and the transverse processes of the atlas were tender. Both head rotation in flexion and the asymmetry test were positive.

Plain radiographs suggested rotatory fixation (Fig. 1) and cineradiography confirmed that the atlas and axis were moving as one unit. Skull caliper traction was applied and both pain and torticollis settled over the next few days. Reduction was confirmed radiologically, and, after six weeks in a collar, the patient had a full pain-free range of movement.

Case 2. A 22-year-old nurse turned her head to look behind her in her car and felt an audible click. She developed severe pain in the upper cervical spine with paraesthesia in the distribution of the greater occipital nerve. On examination, the left sternomastoid was tender and rotation and lateral flexion to the right were restricted. There were no abnormal neurological signs. Both the head rotation in flexion and asymmetry tests were positive. Radiographically, asymmetry of the

atlanto-dental interval of more than 4 mm suggested rotatory fixation (Fig. 2); this was confirmed by cineradiography. Cervical halter traction was applied and after 10 days there was clinical and radiological normality. Tenderness over the transverse processes settled after a month.

Case 3. An 18-year-old man was thrown onto his neck during judo and complained of tenderness over the axis. His head was slightly flexed and tilted but there was no muscle spasm. Head rotation in maximal flexion was painful and restricted on one side. There were no neurological signs or symptoms.

The plain radiographs showed an asymmetrical atlanto-dental interval (Fig. 3) and cineradiography in the lateral position confirmed the diagnosis. Overnight halter traction in hospital relieved the pain and secured clinical reduction. At review after three weeks in a collar there was a full range of pain-free movement, with clinical and radiological normality.

DISCUSSION

In Type 1 of atlanto-axial rotatory fixation there is no ligament damage and the obstruction to reduction is not known with certainty. Wortzman and Dewar (1968) suggest that there may be a capsular tear with interposition of soft tissue. Reduction may be obstructed in the early stages by swollen capsular and synovial tissues and by associated muscle spasm (Fielding et al. 1978).

As reported by Johnson and Fergusson (1986) in children, atlanto-axial rotatory fixation, if diagnosed early, will generally improve with a short period of traction. Such traction may relieve muscle spasm and release invaginated synovial fringes from within the facet joints. In our cases, early clinical and radiological diagnosis allowed reduction to be rapidly achieved. The three patients we report were seen within a period of four months; we suggest that some cases of "upper cervical sprains" are the chronic result of Type 1 rotatory fixation. In view of these potential problems we feel that it is important to diagnose and treat atlanto-axial fixation in the acute stage.

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