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Posterior atlanto-axial subluxation in rheumatoid arthritis

Among 130 patients operated for rheumatoid arthritis of the cervical spine, four patients had the rare condition of posterior subluxation of the atlas. After fusion they were relieved of pain and their neurologic dysfunction improved.

Seppo Santavirta
Jerker Sandelin &
Pär Slätis

Division of Orthopaedic Surgery and Traumatology, Surgical Hospital, University Central Hospital, Kasarmik. 11–13, Helsinki 13, Finland

Rheumatoid arthritis often causes atlanto-axial and sub-axial subluxations (Smith et al. 1972, Marks & Sharp 1981). The most common of these dislocations is anterior atlanto-axial subluxation. Backward dislocation of the atlas is, however, extremely rarely observed and only a few cases have been reported (Verjaal & Harder 1965, Isdale & Corrigan 1970, Frigaard 1978, Teigland & Magnaes 1980, Hart et al. 1981). We have observed four cases of posterior atlanto-axial subluxation among 130 patients operated during 1974–1982 for rheumatoid cervical spine lesion.

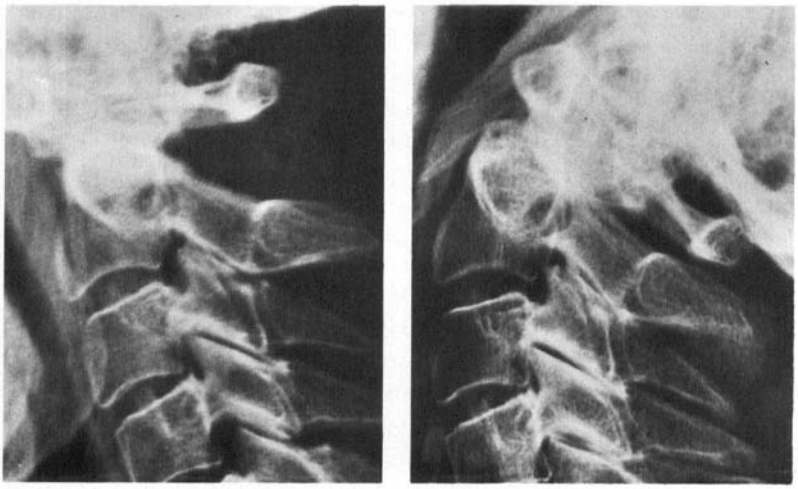
Patients

Case 1

A 55-year-old man had suffered from rheumatoid arthritis and Bechterew's disease for 20 years. In 1968, after a minor neck distension, the cervical spine was radiographed, revealing a minor radiolucent cyst formation in the odontoid process, but otherwise normal conditions in the upper cervical spine. In January 1981, he was examined in a local hospital for increasing occipital pain. Radiographic examination now revealed a posterior atlanto-axial subluxation, but the neurological findings were normal. In July 1981 he began to feel weakness in the upper and lower limbs, experienced difficulties in walking and was admitted to our unit 1 month later. At this time voluntary muscle strength in both the upper and lower limbs was reduced. Pain sensation was partly absent in the left lower leg corresponding to dermatomes L 5–S 2 as well as in both upper extremities corresponding to dermatomes C 7–8. The head was supported with a soft collar, but in the upright position the weakness in the upper and lower extremities increased further, and the patient complained of a glove-like numbness in both hands.

Standard radiographic examination of the neck and cervical myelography combined with computed tomography of the upper cervical spine revealed that

Figure 1. Case 1. A. Posterior luxation of the atlas. B. Tomogram; the luxation is due to an eroded and fractured odontoid process. C. Computed tomography shows the posterior luxation of the atlas and demonstrates the cord compression.



A B

Figure 2. Case 2.
A. Head in flexion showing the atlas in neutral position.
B. Extension with a posterior subluxation of the atlas.

the odontoid process was fractured, and the atlas with the fragment of the odontoid process were dislocated 15 mm backwards (Figure 1). In the cervical myelogram the contrast medium slowly passed the C 1–2 level. In addition, there was spinal compression at the C 2 to C 4 levels.

In September 1981, a laminectomy was performed from C 2 to C 4 and the procedure was completed with fusion from C 1 to C 5. One day after the operation, sensory and motor function in the upper and lower limbs had improved and the numbness in the hands began to diminish. Skull traction was used for 6 weeks postoperatively, and a collar was kept on for 3 months. Six months after the operation, the patient was free of his previous neurologic symptoms.

Case 2

A 52-year-old woman had suffered from severe rheumatoid arthritis for 7 years when she began to complain of diffuse occipital pain. Gradually she began to feel instability in the upper cervical area when extending and flexing her neck and a glove-like numbness in both hands. Clinical examination revealed a disturbance of sensibility in both hands, although the reflexes in the upper extremities were brisk and no motor impairment could be detected.

Radiographic examination revealed an atlanto-axial instability with the atlas riding over the top of the odontoid process (Figure 2). The excursion of the anterior arch was 13 mm forwards on flexion and 7 mm backwards on extension. Computed tomography showed a strongly eroded odontoid process, and a posterior dislocation of the atlas in the neutral position of the head. On forward flexion the atlas, by moving anteriorly, caused compression of the cord, seen in the myelogram. The posterior subluxation in this case was due to a strongly eroded dens, allowing a movement of the atlas of 20 mm.

A posterior C 1–3 fusion was performed. The postoperative course was uneventful. Three months after the operation she still had numbness in both hands, but the pain in the occipitocervical area had disappeared, as had the feeling of instability in the upper part of the neck. Twelve months later there was still some disturbance of sensation in both hands, although the numbness had almost completely disappeared. The reflexes in the upper extremities remained brisk.

Case 3

A 32-year-old woman had had severe rheumatoid arthritis since she was 12. For a year and a half she had had a deep aching pain in the occipital area. Furthermore, during the last year a slight numbness had appeared in the fingers of both hands, along with weakness in the upper extremities. On clinical examination she had an impaired pin-prick test and sensory disturbance of the fingers in both hands. The reflexes in the upper and lower extremities were normal, but there was weakness in the muscle strength of the upper extremities, although severe joint destruction made assessment difficult.

On radiographic examination, an atlanto-axial instability of 13 mm was found. An eroded odontoid process enabled the atlas to move backwards into a posterior luxation position on extension of the neck. Computerized tomography with the head in the neutral position revealed a small and eroded odontoid process which was in close contact with the cord.

However, no compression of the cord could be demonstrated.

A posterior C 1–2 fusion was performed according to Gallie (1939). After the operation the patient was treated with a stiff collar for 6 weeks and with a soft support for a further 6 weeks. One year after the operation the numbness in the fingers had vanished; the patient was free from neck pain.

Case 4

A 73–year–old woman had suffered from severe rheumatoid arthritis for 12 years. During the last year she had complained of increasing occipito-cervical pain and vertigo. On two occasions she had lost consciousness for a short time. Further, she had a tingling sensation in all the fingers of both hands. Because of the rapid deterioration of the situation, she was referred to our unit for further evaluation. On admission, she was bedridden because of severe occipito-cervical pain. Except for slight sensory impairment in both hands, neurological examination did not reveal other signs of cord compression. During the subsequent 4 weeks in hospital, paresis of her upper extremities ensued. Moreover, vertigo and daily occasional loss of consciousness for a few minutes were suggestive of vertebral artery compression.

Radiographic examination of the cervical spine showed generalized osteoporosis, erosions of the spine and narrowing of the disc spaces. Tomography in the antero-posterior direction revealed a severe lateral dislocation of the atlanto-axial joint. The lateral view revealed a posterior atlanto-axial subluxation in extension due to a fractured odontoid process. Computed tomography augmented with cervical myelography completed the radiographic examination and did not provide evidence of cord compression with the head in the neutral position.

Skull traction was applied with rapid improvement of the neurological symptoms. One week later, an occipitocervical fusion was performed. Postoperatively, skull traction was maintained for 6 weeks and during the 3 subsequent months the patient wore a stiff collar. One year later she had no pain in the occipito-cervical region, the neurological defects in the upper extremities had subsided, no fits of unconsciousness recurred, and bony fusion of the graft had occurred.

Discussion

Backward luxation of the atlas may occur in rheumatoid arthritis, affecting atlanto-axial stability, because of a spontaneous fracture of the odontoid process, erosion of the entire bone peg, or a defect in the anterior arch of the atlas. The condition is associated with a long duration of rheumatoid disease and multifocal severe affections of the joints (Ornilla et al. 1972, Rasker & Cosh 1978, Weissman et al. 1982).

Backward dislocation of the atlas is potentially dangerous because with a backward shift the free-floating atlas is more unrestricted than the more common forward atlanto-axial dislocation. Hence the risk of cord compression and the subsequent development of symptoms is greater (Bland 1974, Teigland & Magnaes 1980). Progressive spastic tetraplegia leading to death of the patient has been reported in connection with backward subluxation (Verjaal & Harder 1965). The grade of anatomic cord compression can be estimated from focused conventional tomograms. Computed tomography combined with myelography gives, however, further information by revealing other co-existent rheumatoid lesions in the cervical spine. Granulation tissue arising from the affected juxtapositioned joints may cause cord compression in unexpected locations (Castor et al. 1983, Kaufman & Glenn 1983) and can be accurately delineated by cervical tomograms (Kudo et al. 1984).

Our cases suggest that atlanto-axial fusion is sufficient to stabilize the deformity. Interestingly, the neurological signs and symptoms subsided after the operation. Concominant subaxial dislocations must be examined, however, and in cases of cord compression laminectomies and posterolateral fusions should be added.

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