

Atlanto-axial subluxation: a case report

Robert D Thurlow, DC, DABCR, FCCR*

One of the causes of death in rheumatoid patients is cord compression following atlanto-axial subluxation. Dislocations in the cervical spine are common with patients who have rheumatoid arthritis. Anterior subluxation occurs in up to 35%, followed by vertical subluxation in 22.2%, lateral subluxation in 20.6% and rarely posterior subluxation. A case report is presented to illustrate such a complication. (JCCA 1988; 32(2): 81-84)

KEY WORDS: atlanto-axial subluxation, rheumatoid arthritis, manipulation, chiropractic.

L'une des causes de décès chez les patients souffrant de rhumatisme est la compression de la moelle épinière subséquente à une subluxation atlanto-axiale. Les dislocations de l'épine cervicale est fréquente chez les patients souffrant de rhumatismes rhumatoïdes. Une subluxation antérieure se présente dans jusqu'à 35% des cas, suivie par une subluxation verticale à 22%, latérale à 20,6% et rarement une subluxation postérieure. Un rapport de cas accompagne la présentation d'une telle complication. (JCCA 1988; 32(2) 81-84)

MOTS CLÉS: subluxation atlanto-axiale, arthrite rhumatoïde, manipulation, chiropraxie.

Introduction

The relevance of the atlanto-axial joint, lies not only in its anatomy and biomechanics, but also in the disease processes that affect its stability. This stability is vital considering its intrinsic relationship to the vascular and neurological contents of the spine. Failure requires delicate surgical intervention. Historically, Pilcher¹ in 1900 performed an open reduction of an atlanto-axial dislocation and inadvertently fused the axis to the skull, presumably by surgical trauma, thereby performing the first arthrodesis for atlanto-axial instability.

In reviewing the normal anatomy of this region, Koebke's² paper describes the cartilaginous surfaces of the adult atlas and axis as having a central plateau, extending transversely from the medial to the lateral edge. This profile is compared to the slope of a roof having an anterior to posterior pitch, separated by a narrow ridge. Because the medial plateau is not seen in newborns, Koebke² considers the ridge a morphological adaptation to specific joint stress.

Roentgenographic studies³ show that the centre of rotation is not the odontoid process of the axis, but rather the lateral joint surface which is opposite to the direction of rotation. According to Fielding³, 50% of total head rotation occurs at the atlanto-axial joint before any further rotation occurs in the remaining cervical spine.

A potential catastrophic result of rheumatoid arthritis is instability of the atlanto-axial joint. This makes finding it of great clinical significance. This paper discusses the importance of detecting atlanto-axial subluxations, with emphasis on rheumatoid arthritis. A case report is presented to illustrate this, as well as a carefully selected plan of management.

Case report

With a 45 year history of rheumatoid arthritis, this 74 year old female, on April 1979, presented with pain along the greater occipital nerve on the right, right posterior neck pain, pain in the

right scapula area as well as right lower back pain. Numbness was reported in both arms and in the first, second and third fingers of both hands. In addition, there was very little appreciation in the fingers to hot or cold applications. The patient's rheumatoid arthritis had started when she was 30 years old. She was not aware of any familial history of the disease. When she attended for treatment, her hands showed the ravages of the disease with marked joint deformity and joint dislocation. A maintenance dose of prednisone, 2.5 mg. every other day, had been ongoing for quite some time.

On examination, the cervical spine range of motion was approximately half the normal range, with the exception that flexion was normal. Moderate pain was reported in the cervical spine during all movements. The neutral and left and right foraminal compression tests were positive. The upper extremity reflexes were +1. Pinwheel testing indicated diminished sensitivity in the left 1st, 3rd and 5th fingers. There was no unusual para-spinal muscle or joint tenderness to deep palpation of the cervical spine or cervical musculature.

Examination of the lumbar spine revealed a fairly normal range of movement in all directions, with mild dorso-lumbar pain at the extremes of each movement. Kemp's test was positive on the left and right, and straight leg raising in the standing position was positive bilaterally. There was no paraspinal muscle tension or facet joint tenderness to deep palpation. The patellar and achilles' reflexes were +1. Blood pressure was 156/86. A systolic heart murmur was heard over the aortic and pulmonary valves. Hemoglobin was 12.5gm. Urinalysis was essentially normal.

Significant x-ray findings reveal an atlanto-axial dislocation of 22mm when viewed in the neutral or flexed position. On extension, the atlas assumes a normal alignment. (Figures 1, 2 and 3)

The patient initially received specific mid and lower cervical spine manipulation as well as lumbar spine mobilization and manipulation. After eight visits, the lower back pain had improved, although there was still some numbness in both arms and hands. In the meantime, arrangements were made for the

* 970 Main St. West, Hamilton, Ontario L8S 1B2
© JCCA 1988

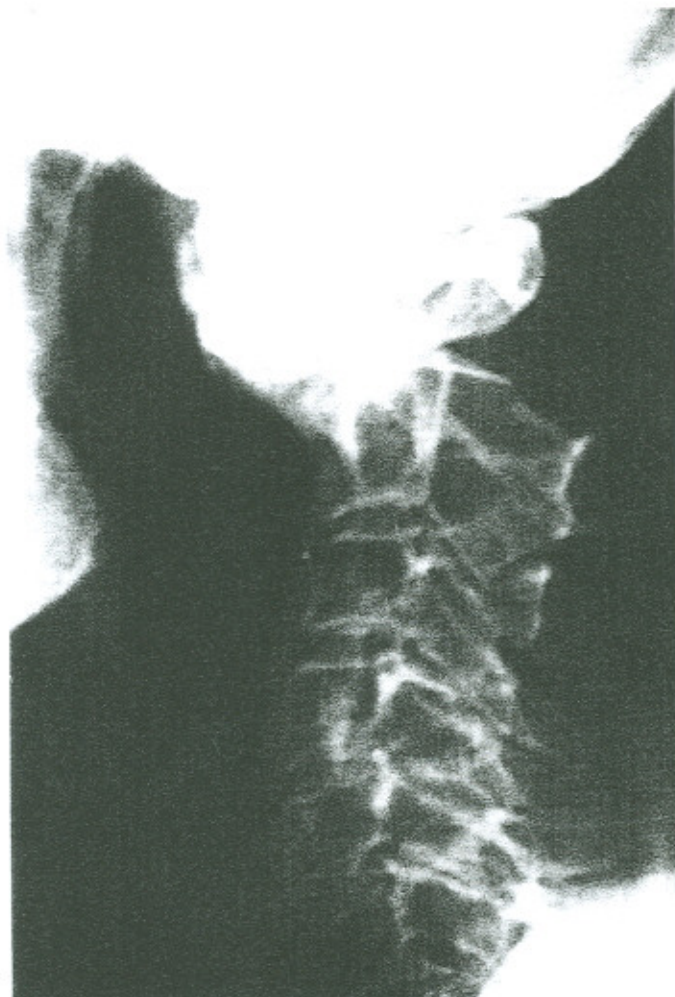


Figure 1 Neutral lateral view of the cervical spine. Note the atlanto-axial dislocation of 22mm.

patient to see an orthopedic surgeon. On October 25, 1979 a posterior stabilization was performed. (Figure 4)

Two years after the cervical spine stabilization surgery, the patient returned to my office complaining of occipital and frontal headaches, since the surgery in 1979. In addition, she was experiencing a soreness and itching in the scalp and a constant numbness in the left arm and left leg. Between 1979 and 1981, there was an exacerbation of her rheumatoid arthritis during which time she had cortisone injections in both knees and hot wax applications to both hands.

Cervical spine range of motion at this time was mildly painful on extension and left and right sidebending. Left and right rotation was reduced to 45° on the left and 55° on the right. The foraminal compression test was normal. The upper extremity reflexes were +1. Pinwheel appreciation was diminished in the left thumb, middle and little finger. Lumbar spine testing was

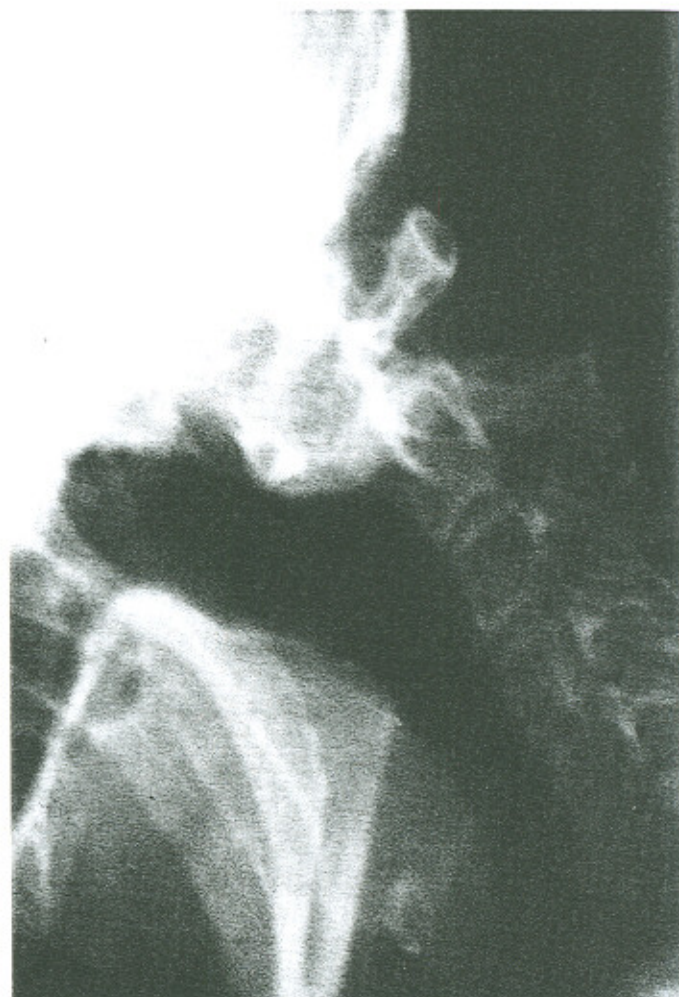


Figure 2 Lateral cervical spine x-ray in full flexion.

unremarkable with the exception that Kemp's test was positive bilaterally, producing lumbo-sacral pain.

Over a three month period, after determining via stress radiographs, that the atlanto-axial surgical fixation was stable, the patient received specific mid and lower cervical spine manipulation and lower back mobilization and manipulation. At the conclusion of the treatments, the lower back pain had diminished and the headaches had disappeared. The patient was not seen again until 6 months later for a minor lower back strain. During that 6 month interval, there had not been a recurrence of the headaches or scalp complaints. There has been no follow-up in the past 5 years.

Discussion

One of the causes of death in rheumatoid patients is cord compression following atlanto-axial subluxation⁴. This makes



Figure 3 Lateral cervical spine x-ray in extension. Note that the atlas assumes a normal alignment.



Figure 4 Neutral lateral view of a cervical spine following a posterior stabilization.

the finding of atlanto-axial subluxation of great importance.

Braakman⁵, in his study of old cervical spine luxations, found that radicular lesions occurred not only after successful reduction, but also after failure of reduction. He did, however, find that early reduction, of no more than two weeks' duration, reduced the risk of late progressive cord symptoms. In his study, two patients who initially had no neurological symptoms subsequently developed cord lesions.

In Fielding's¹ sample of 57 patients with atlanto-axial instability, 1/3 had neurological complaints, 1/3 had pain and stiffness and 1/3 were asymptomatic. In eight patients in the study with rheumatoid arthritis, five had neurological complaints and three had neck complaints. None of the rheumatoid patients were asymptomatic.

Fielding¹ states that while the spinal cord is quite susceptible to acute pressure, it is relatively resistant to gradual pressure;

hence a slowly progressive displacement may allow the cord to accommodate to the decreased anteroposterior dimension of the spinal cord.

The average atlanto-dental interval in the rheumatoid patients in Fielding's¹ study was 11.1 millimeters. The prevalence of atlanto-axial instability in rheumatoid patients in his sample of hospital in-patients was 8.9 per cent. In suspected cases, according to Fielding¹, stress roentgenograms, in flexion and extension, should be taken to determine the presence and degree of displacement. The stress should be actively imposed by the patient and not the technician.

Fielding's³ paper on Cinerentgenology of the Normal Cervical Spine, found that lateral flexion of the head produced more axis rotation than did simple head rotation. In his experience, it is quite possible that the vertebral artery can be severely compromised in patients with atlanto-axial instability.

not only with flexion movements but also with rotation movements of the head.

In Mathews⁴ paper on 76 consecutive out-patients with rheumatoid arthritis, he found that neck stiffness and paresthesia on neck movements bore no relationship to the amount of the subluxation. An atlanto-dental interval of 3mm or more was considered abnormal in this study, with 25% having an atlanto-dental interval greater than 3mm. Mathews⁴ found that subluxation was more common in patients with rheumatoid arthritis of longer duration. He found it more frequently in patients with positive tests for rheumatoid nodules or severe erosions, and also more common in males. Of seventeen patients on corticosteroid treatment, nine had subluxation. Mathews⁴ paper reported a vertebral artery thrombosis in a patient with cervical rheumatoid arthritis. Braaf⁶ describes symptoms such as vertigo, tinnitus, deafness, numbness down the arm, gastro-intestinal disturbances, blurred vision and ataxia, when intermittent compression of a vertebral artery occurs.

Sherman⁷ describes vertebral artery infarction in a 38 year old woman who turned her head while driving. She developed occipital headaches, vertigo, blurred vision, ataxia, dysarthria and dysphagia. Other causes from this study included minor falls or automobile accidents, ceiling painting, yoga or gymnastics. Of great significance is a study that revealed that angiographic demonstration of occlusion of one vertebral artery has been shown in asymptomatic volunteers, when the head is turned to the opposite side⁹.

Weissman's⁸ paper defined subluxation to be present if the C1-C2 relationship was greater than 2.5mm. In the same study, Weissman considered lateral subluxation (20.6%) to be present if, on the frontal view, the lateral masses of C2 were more than 2mm lateral to the C2 articulation. Atlanto-axial impaction (22.2%) (vertical subluxation) occurred when there was bone loss from the adjacent surfaces of the anterior arch of atlas and the "shoulders" of the C2 body. Axial impaction frequently produces a posterior subluxation with a break in the spinolaminar line. Atlanto-axial impaction occurs as the anterior arch of the atlas gradually settles lower on the odontoid peg, first with the base and later with the body of C2.

Conclusion

Anterior subluxation occurs in 25% to 35% of patients with rheumatoid arthritis that involves the cervical spine. The most frequent subluxation is the anterior variety, although lateral and posterior subluxations also occur less frequently. When atlanto-axial impaction is present, smaller amounts of anterior subluxation produce cord symptoms.

The ravages of rheumatoid arthritis can also affect the atlanto-occipital region. Redlund-Johnell¹⁰ describes an incidence of between 0.5 and 0.8% in a sampling of 407 and 43 patients, respectively. In all instances the subluxation of the occiput was posterior to the atlas.

References

- 1 Fielding JW, Hawkins RJ, Ratzan SA. Spine fusion for atlanto-axial instability. *J Bone Joint Surg* 1976; 58A(3): 400-407.
- 2 Koebeke J, Brade H. Morphological and functional studies on the lateral joints of the first and second cervical vertebrae in men. *Anat Embry* 1982; 164: 265-275.
- 3 Fielding JW. Cineurography of the normal cervical spine. *J Bone Surg* 1957; 39A(6): 1280-1288.
- 4 Mathews JA. Atlanto-axial subluxation of rheumatoid arthritis. *Ann Rheum Dis* 1969; 28: 260-265.
- 5 Braakman R, Vinkin PJ. Old luxations of the lower cervical spine. *J Bone Joint Surg* 1968; 50B(1): 52-60.
- 6 Braaf M, Rosner S. Menière-like syndrome following whiplash injury of the neck. *J Trauma* 1962; 2: 494-500.
- 7 Sherman DG, Hart RG, Easton JD. Abrupt change in head position and cerebral infarction. *Stroke* 1981; 12(1): 2-6.
- 8 Weissman BN, Aliabadi P, Weinfeld MS, Thomas WH. Prognostic fractures of atlanto-axial subluxation in rheumatoid arthritis patients. *Acta Radiol* 1982; 144: 745-751.
- 9 Faris AA, Poser CM, Wilmore DW, Agner CH. Radiographic visualization of neck vessels in healthy men. *Neurology* 1963; 13: 386-396.
- 10 Redlund-Johnell I. Atlanto-occipital dislocation in rheumatoid arthritis. *Acta Radiol* 1984; 25: 165-168.



Anglo-European College of Chiropractic

The Anglo-European College of Chiropractic is expecting another large student intake in September 1989 and we therefore need to increase the size of our Faculty.

We are looking for Chiropractors with well developed Clinical problem solving skills and an interest in, and understanding of, learning processes. Teaching qualifications or experience as a teacher is considered an asset, but not a necessity. A minimum of two years of Private Practice experience is mandatory. We expect the successful candidate to be co-operative and to have a well developed ability to think.

The position involves both lecturing responsibilities and supervisory duties in a highly successful College Clinic.

To apply, send your Curriculum Vitae together with a handwritten covering letter to:

Dr. A. Christensen
Principal, Anglo-European College of Chiropractic
13/15 Parkwood Road
Bournemouth BH5 2DF
Dorset, ENGLAND