TJTES
TURKISH JOURNAL OF TRAUMA
& EMERGENCY SURGERY

Ulus Travma Derg. 2003 Jan;9(1):76-78

# CHANCE TYPE CERVICAL FRACTURE AND NEUROLOGICAL DEFICITS IN ANKYLOSING SPONDYLITIS

**Selçuk YILMAZLAR, MD*, Hasan KOCAELİ, MD*, Muammer DOYGUN, MD***

***ABSTRACT***

*Prevention of sudden neck movements is vital in patients with ankylosing spondylitis of the cervical spine. We present a case of ankylosing spondylitis who sustained a cervical fracture. He presented with paraplegia after a minor car collision and died of pulmonary embolism after the operation for anterior stabilisation. We believe that the most important matter in a patient with advanced ankylosing spondylitis is the prevention of the fractures and complications. The need for neck protection in automobiles was emphasized and the literature reviewed about the occurrences of neurological deficits following trauma.*

***Key words:*** *ankylosing spondylitis, car accident, cervical spine fractures, spinal cord injury, prevention of pulmonary embolism*

## INTRODUCTION

Ankylosing spondylitis (AS) is a chronic inflammatory condition affecting axial joints and bones with a reported prevalance of 0.02 to 0.23% (1). Patients with AS are more susceptible to fractures in the cervical region than any other part of the spine. The fracture line usually affects all three columns of the vertebrae and therefore tends to be extremely unstable with inevitable neurological deficit (2-5). In the presence of osteoporosis of the cervical bone, subluxation and degeneration from previous lower cervical spine involvement may contribute to the susceptibility for this type of fracture (6,7). The primary pathological process of AS includes calcification of the intervertebral discs and ossification of the ligaments with ankylozis of the apophyseal joints resulting in marked immobility and subsequent generalized osteoporosis of the vertebral bodies. Pain and stiffness in the cervical joints and surrounding muscles are followed by decreased ability of neck extension, making the cervical spine more susceptible to injury after minor trauma (8,9). Informing patients of their cervical spine fragility and developing tools that immobilises the flexed position of the spine will greatly reduce the morbidity and mortality secondary to minor motor vehicle traffic accidents.

## CASE REPORT

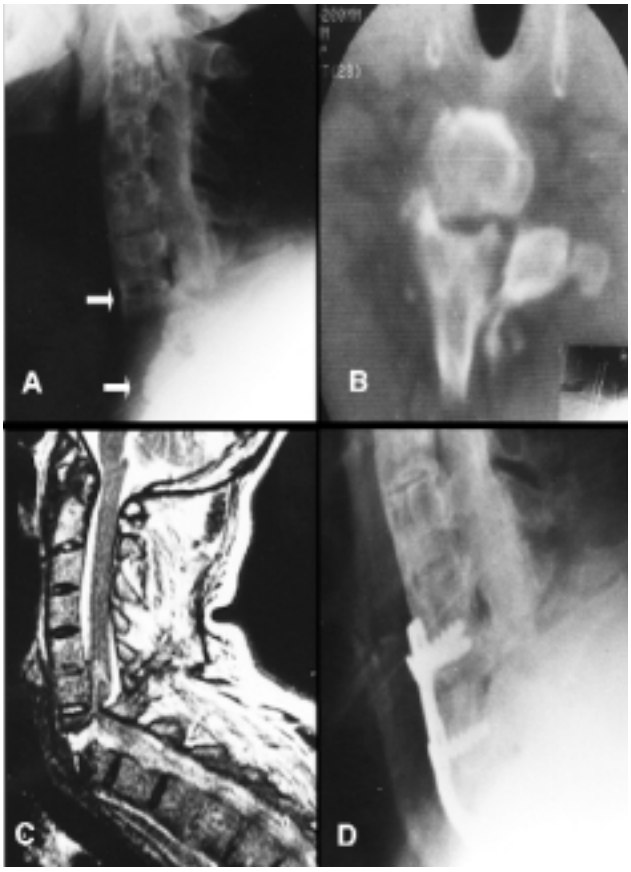
A 45-year-old retired pilot presented with paraplegia due to a hyperextension type cervical injury secondary to a minor traffic accident. He had been suffering from AS for the last twenty years. An MRI scan of the cervical region revealed an axial fracture of C7 vertebra (the so-called Chance fracture) through the corpus with obvious compression of the medulla spinalis (Picture 1 A,B,C). The patient was placed in a halo brace carefully and then underwent anterior cervical surgery for spinal stabilisation (Picture 1 D). Postoperatively, his neurological deficit was unchanged but on the fifth postoperative day, the patient was lost due to pulmonary embolism.

## DISCUSSION

Patients with advanced AS are prone to fractures of the lower cervical spine following minor injuries in unexpected times (8,10). The occurrence of traumatic cervical spine injury in these patients is 3.5 times greater than the incidence in the normal population and may be minor as in rapid acceleration and deceleration (11-13), as this can result in hyper-extension of the head. Sixty-six percent of the fracture subluxations of the ankylosed spine are associated with injury to the spinal cord, and the mortality rate is 40% (14). Olerud et al., reviewed 31 AS patients with spinal fractures of the reported 19 patients with cervical spine injuries, one third developed immediate neurological impairment (15). Ramos-Remus et al., studied 103 patients to determine the prevalence of atlanto-axial subluxation and its neurological effect in AS. Atlanto-axial subluxation was observed in 24 (23.3%) patients, which suggests that subluxation may occur in minor trauma and may cause spinal cord compression (16).

Olerud et al studied the survival of 65 patients with cervical trauma to evaluate whether a cervical

spine fracture increases the death risk in elderly patients and to define risk factors. AS proved to be a significant risk factor for death in seven of these patients (10.7%) who suffered of it. Patients having AS run a higher than normal risk of sustaining cervical spine fractures (17). As in cervical spine fractures of the general population, the lower cervical spine from C5 to T1 is the most common



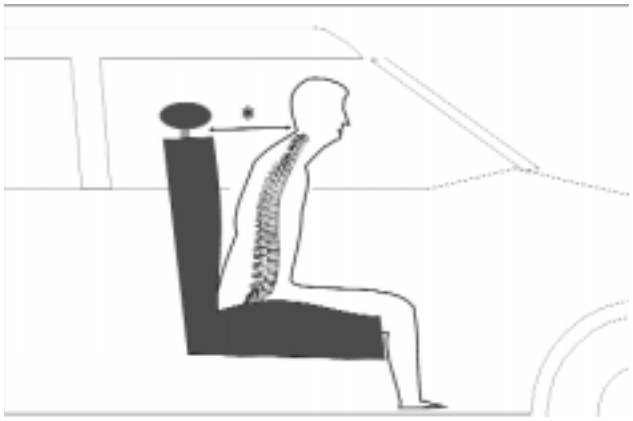

**Picture 1 A:** Cervical lateral graph shows typical chance type fracture. Arrows represent disruption of the C7 corpus fracture axially. **B**: Axial CT image at the fracture level **C**: Sagittal view of the cervical spine MRI of the patient. A corpus fracture was demonstrated at the C7 level. Note that the fracture extends through vertebral body including all three columns. Spinal cord injury is inevitable in this case. **D:** Postoperative stabilization with cervical anterior plate screw fixation.

site of injury (4). Harding et al reviewed the radiological and clinical features as well as the mortality rates of patients with AS complicated by cervical trauma. There were 19 cervical fractures in 18 patients, which were usual for AS (chance, chalk-stick fractures or broken bamboo) and occurred predominantly at the $6^{th}$ and $7^{th}$ cervical levels (2).

Evaluation of patients with AS should include a full radiographic survey of the spine since a rare additional spinal fracture may be identified. When a fracture is identified, a radiological investigation of the area is obtained to fully elucidate the nature of the fracture. The nature of these fractures was unusual than the cervical trauma of the normal population in our literature survey. It was reported that classic radiological investigations are insufficient in cases of traumatic cervical fracture associated with AS (18). During the transfer of the patients and diagnostic processes; the patients' head should be maintained in a neutral position by placing a cushion under their head, which corresponds to flexion for these patients. As with other spine injuries, MRI is more sensitive than CT scanning for the detection of spinal cord contusions, ligamentous injury, herniated discs and spinal epidural hematomas with the latter's reported incidence ranging from 10-50%. Spinal epidural hematomas must be ruled out in cases with a free interval between the trauma and the onset of the neurological signs or a neurological deterioration of the established spinal cord injury (3,19,20). Rowed et al identified 21 (1.3%) patients with AS in a series of 1578 patients with acute spinal trauma. The most common causes of spinal cord compression, except fracture dislocations in AS patients with spinal fractures, were epidural hematoma and, disc herniation (21).

The ioeal treatment for cervical fractures in AS is controversial (22). Although the surgical approach allows to earlier mobilisation, conservative treatment with external immobilization and surgical stabilization and fusion has resulted in similar outcomes. If axial traction is required to reduce a subluxation, only minimal weight should be used and it must be placed in a superior and anterior direction to let the patient returns to the pre-existing kyphosis. Regardless of the treatment used, respiratory complications due to pulmonary fibrosis and restricted thoracic movement of ankylosed ribs as seen in these patients remain a primary cause of death. Deep venous thrombosis with resultant pulmonary embolism is a dreaded pathology for acute spinal cord injured patients with a reported incidence ranging 9% to 90% (23). Preventive measures such as use of low molecular weight heparin, early mobilization and elastic stockings should be the mainstay of the postoperative therapy. Patients with a cord lesion still face poor prognosis, with the mortality rate ranging from 35-57% (7,20). For these reasons, prevention of the spinal cord injury is most important deal.

In patients with severe AS due to the fixed flexed position of the cervical spine, there remains a dead space between the neck and automobile seat, even when the seat is in the vertical position, thus making the patient susceptible to hyperextension type injuries (Picture 2). Precautions for reducing this



**Picture 2.** Schematic illustration shows typical sitting position in the car for the patient with ankylosing spondylitis. *There is a dangerous dead space between the neck and car seat in these patients.

potentially dangerous dead space between the cervical spine and the automobile seat with specially designed cushions should be considered by the car manufacturers and the orthotist. Alarming and informing patients about the delicacy of their spine and how to elude situations leading to spinal trauma may help in avoiding this problem.

## REFERENCES


***1.*** *Peter E. Lipsky Goldman. The spondyloarthropathies. In: Cush JJ, ed. Cecil Textbook of Medicine, 21st ed. W. B. Saunders Company; 2000: 1500-1507.*

***2.*** *Harding JR, McCall IW, Park WM et al. Fracture of the cervical spine in ankylosing spondylitis Br J Radiol. 1985;58: 3-7.*

***3.*** *Tico N, Ramon S, Garcia-Ortun F et al. Traumatic spinal cord injury complicating ankylosing spondylitis. Spinal Cord.1998; 36:349-352.*

***4.*** *Detwiler KN, Loftus CM, Godersky JC et al. Management of cervical spine injuries in patients with ankylosing spondylitis. J Neurosurg. 1990;72: 210-215.*

***5.*** *Denis F. Spinal instability as defined by the three-column spine concept in acute spinal trauma. Clin Orthop. 1984; 189:65-76.*

***6.*** *Deburge A, Guigui P, Ouahes M, Barre E. Cervical pseudarthrosis in ankylosing spondylitis. A case report. Spine. 1996; 21:2801-2805.*

***7.*** *Murray GC, Persellin RH. Cervical fracture complicating ankylosing spondylitis: a report of eight cases and review of the literature. Am J Med. 1981; 70:1033-1041.*

***8.*** *Hunter T, Forster B, Dvorak M. Ankylosed spines are prone to fracture. Can Fam Physician. 1995; 41:1213-1216.*

***9.*** *Kiwerski J, Wieclawek H, Garwacka I. Fractures of the cervical spine in ankylosing spondylitis. Int Orthop. 1985; 8:243-246.*

***10.*** *Salathe M, Johr M. Unsuspected cervical fractures: a common problem in ankylosing spondylitis. Anesthesiology. 1989; 70:869-870.*

***11.*** *Kewalramani LS, Taylor RG, Albrand OW. Cervical spine injury in patients with ankylosing spondylitis. J Trauma. 1975;15:931-934.*

***12.*** *Osgood CP, Abbasy M, Mathews T. Multiple spine fractures in ankylosing spondylitis. J Trauma. 1975; 15:163-166.*

***13.*** *Podolsky SM, Hoffman JR, Pietrafesa CA. Neurologic complications following immobilisation of cervical spine fracture in a patient with ankylosing spondylitis. Ann Emerg Med. 1983;12:578-580.*

***14.*** *Kewalramani LS, Taylor RG, Albrand OW. Cervical spine injury in patients with ankylosing spondylitis. J Trauma. 1975; 15: 931-934,.*

***15.*** *Olerud C, Frost A, Bring J. Spinal fractures in patients with ankylosing spondylitis. Eur Spine J. 1996; 5:51-55.*

***16.*** *Ramos-Remus C, Gomez-Vargas A, Guzman-Guzman JL et al. Frequency of atlantoaxial subluxation and neurologic involvement in patients with ankylosing spondylitis. J Rheumatol. 1995; 22:2120-2125.*

***17.*** *Olerud C, Andersson S, Svensson B et al. Cervical spine fractures in the elderly: factors influencing survival in 65 cases. Acta Orthop Scand. 1999; 70:509-513.*

***18.*** *Iplikcioglu AC, Bayar MA, Kokes F et al. Magnetic resonance imaging in cervical trauma associated with ankylosing spondylitis: report of two cases. J Trauma. 1994; 36:412-413.*

***19.*** *J Wu CT, Lee ST. Spinal epidural hematoma and ankylosing spondylitis: case report and review of the literature. Trauma. 1998; 44:558-561.*

***20.*** *Foo D, Sarkarati M, Marcelino V. Cervical spinal cord injury complicating ankylosing spondylitis. Paraplegia. 1985; 23:358-363.*

***21.*** *Rowed DW. Management of cervical spinal cord injury in ankylosing spondylitis: the intervertebral disc as a cause of cord compression. J Neurosurg. 1992; 77:241-246.*

***22.*** *Graham B, Van Peteghem PK. Fractures of the spine in ankylosing spondylitis. Diagnosis, treatment, and complications. Spine. 1989; 14:803-807.*

***23.*** *Aito S, Pieri A, D'Andrea M et al. Primary prevention of deep venous thrombosis and pulmonary embolism in acute spinal cord injured patients. Spinal Cord. 2002; 40:300-303.*



*Uludag University, School of Medicine, Department of Neurosurgery, Bursa TURKEY
**Corresponding Author: Selcuk Yılmazlar, MD**
Uludag Universitesi, Tıp Fakültesi, Nöroşirürji Anabilim Dalı, Gorukle, 16059 Bursa/ TURKEY
E-mail: selsus@uludag.edu.tr