# TRAUMATIC SPINAL CORD INJURY IN ANKYLOSING SPONDYLITIS : REPORT OF TWO CASES

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**ABSTRACT**

Ankylosing spondylitis primarily affects the axial skeleton and these patients have tendency to trauma in association with spinal cord injury. Two cases with ankylosing spondylitis and traumatic spinal cord injury are reported and the literature about this subject is reviewed in this article.

**Key words:** Ankylosing spondylitis, Spinal cord injury

**ÖZET**

**ANKİLOZAN SPONDİLİT VE SPİNAL KORD YARALANMASI: İKİ OLGU SUNUMU**

Ankilozan spondilit primer olarak aksiyel iskeleti etkiler ve bu hastalar travma ile ilişkili spinal kord yaralanmasına yatkındır. Bu makalede ankilozan spondilit ve spinal kord yaralanması olan iki hasta sunulmakta ve konu ile ilgili literatür gözden geçirilmektedir.

**Anahtar sözcükler:** Ankilozan spondilit, Spinal kord yaralanaması

## INTRODUCTION

Ankylosing spondylitis (AS) is a chronic systemic inflammatory rheumatic disorder that primarily affects the axial skeleton (13). The prevelance of AS is 1-3 per 1000 in the general population (7). The earliest, most typical and consistent findings are seen in the sacroiliac joint the other regions characteristically affected are discovertebral, apophyseal, costovertebral, and costotransverse joints of the spine, and paravertebral ligamentous structures (1).

Traumatic vertebral fracture is a serious complication of AS it is highly unstable and frequently associated with a neurologic lesion (18). Two patients with AS and traumatic spinal cord injury are reported in this article.

## CASE 1

A 46-year-old male patient applied to our outpatient clinic with complaints of muscle spasm in his legs and difficulty with walking. He was diagnosed as AS 25 years ago and had been followed-up in our rheumatology outpatient clinic for three years. Fourteen months ago he had been involved in a motor vehicle accident which had resulted in severe paraparesis due to C6-7 dislocation, C6 and C7 lamina and facet fracture (Figure 1).

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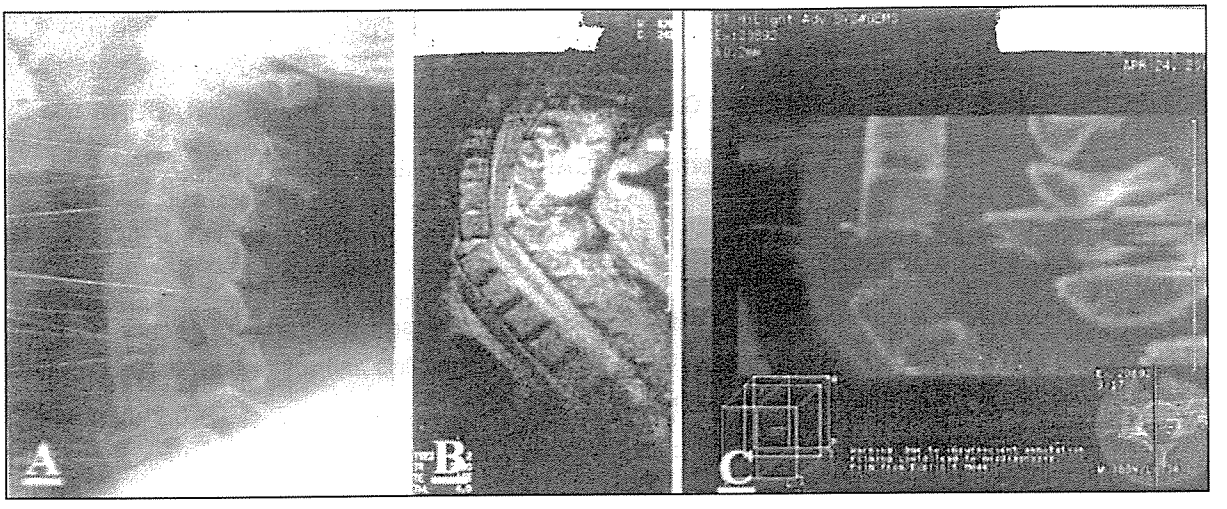


**Figure 1. Preoperative plain radiograph (A), MR image (B), and CT (C) of cervical spine show a distractive fracture-dislocation of C 6-7.**

Gardner traction had been applied for two days in Neurosurgery Department. Taking his primary disease into consideration, neurosurgeons had decided to make a 360° stabilization. He had undergone C5-6-7 posterior lateral mass and transpedicular fixation, C6-7 anterior plating and fibular graft application for C6-7 (Figure 2).

He had had partial improvement in paraparesis. On admission to our clinic, all spinal movements were severely restricted and lomber Schober was measured as 1,5 cm. Shoulder flexion was limited bilaterally. Right hip movements were very painful and there was a flexion contracture of 40°. An increase in dorsal kyphosis and a decrease in lumbar lordosis were observed. According to manual muscle test, upper

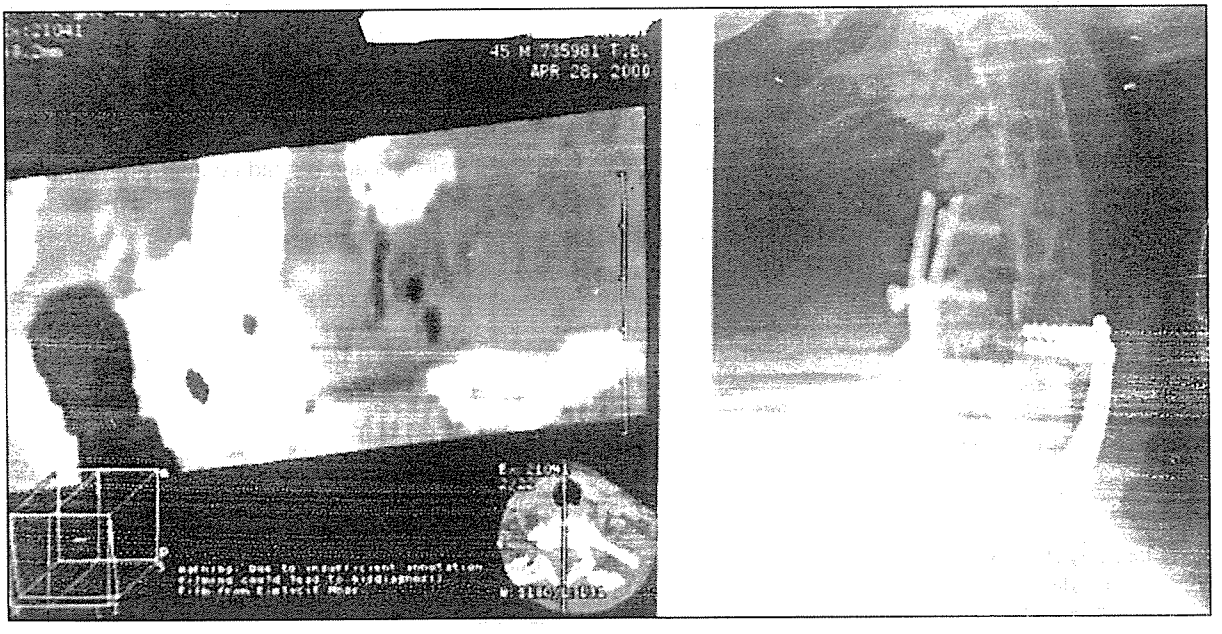

**Figure 2. Postoperative plain radiograph (A) shows the reduction and 360 degree fixation of the involved level. The sagittal reformatted CT of the cervical spine (B) shows decompression of the cervical spine.**

right extremity strength was graded as 3/5 for wrist flexion and extension, 2/5 for finger flexion. Lower right extremity strength could not be assessed because of spasticity and limitations in range of motion (ROM). Muscle strength was 5/5 in upper and lower left extremity. Asworth scale was used to assess spasticity. It was graded as 1 for right elbow, wrist and finger flexor muscles and as 3 for right knee flexor and ankle plantar flexor muscles. Patellar and Achilles reflexes were hyperactive bilaterally. Babinski, Klonus, and Hoffman reflexes were also positive bilaterally. Sensation was normal. He was categorized as D according to ASIA 1996 classification. He could hardly walk by the aid of a walker, with marked flexion at the hip and knee and with equinus position at the ankle. Routine laboratory investigations showed no abnormality. Lateral cervical radiograph demonstrated C5-6-7 posterior spinal instrument and C6-7 anterior plate. Other radiographic findings were marked syndesmophyte formation at the cervical vertebrae, bilateral grade 4 sacroiliitis, marked joint space narrowing and sclerosis at the right hip joint and osteopenia. He participated in a rehabilitation program including application of ice, stretching exercises, and electrical stimulation to spastic muscles, muscle strengthening exercises for upper extremities and walking exercises. The patient also received oral drugs for the treatment of spasticity and botulinum toxin was applied to hamstring and gastrocnemius muscles but he did not show marked improvement.

**CASE 2**

A 59-year-old man with spinal cord injury was transferred to our clinic from Orthopaedics Department in November 2000. He had a history of motor vehicle accident in September 2000, resulting in T11-12 fracture dislocation (Figure 3), multi-fragmanted fracture at the left humeral head, and a fissure in the left fibula. CT scan of the vertebra revealed the neural compression at fracture site. He had undergone posterior spinal instrumentation, posterior fusion with autograft (Figure 4) and partial shoulder arthroplasty. His medical history included AS for 25 years. On examination, neck movements were severely restricted in all planes. There was no active movement in the left shoulder. Passive ROM in the left shoulder

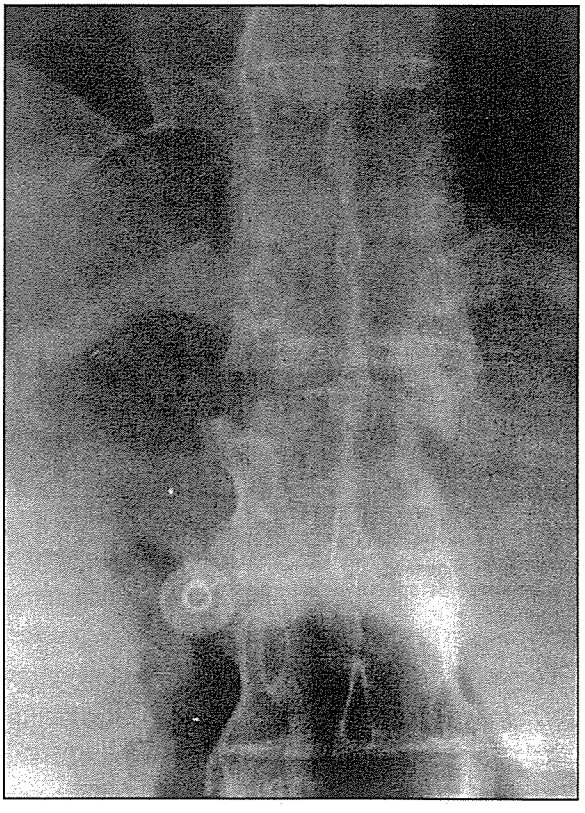

**Figure 3. Lateral translation between T11 and T12 is seen on anteroposterior radiograph.**

was 100° for flexion, 50° for abduction, 10° for external rotation. ROM in the other extremities was normal. Schober index could not be measured. According to manual muscle test, strength was graded as 1/5 for right hip flexion and 2/5 for left hip flexion, 1/5 for right knee extension and 2/5 for left knee extension, 0/5 for both ankle dorsiflexion and plantar flexion. The strength of the upper extremities was normal except the left shoulder. Patellar reflex was hipoactive at right and negative at left, Achilles reflex and Babinski were negative bilaterally. Anal reflex was diminished, anal sensation was impaired and bulbocavernous reflex

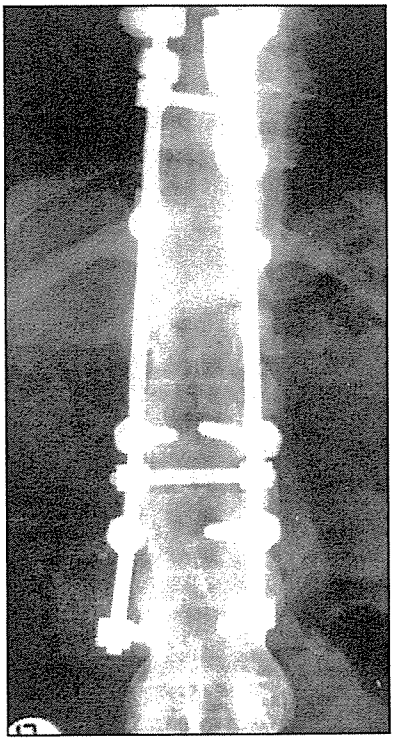

**Figure 4. Complete reduction and long segment posterior instrumentation are seen on postoperative anteroposterior radiogram.**

was absent. He defined anesthesia below L3 dermatome and hipoesthesia in the region innervated by the left axillary nerve. He was categorized as C according to ASIA 1996 classification. Routine labarotary investigations showed no abnormal results. Radiographs of the cervical, dorsal and lumbar vertebrae demonstrated syndesmophyte formation and ligamentous calcification with a bamboo spine appearance, bilateral grade 4 sacroiliitis and a posterior spinal instrument at the thoracolumbar region. Since no active movement in the left shoulder was observed during follow-up and glenohumeral joint alignment was impaired, electromyography was performed and total axonal degeneration was found in the left axillary nerve. As urodynamic examination revealed the bladder to be hyperreflex, oxybutynin hydrochloride 10 mg/day was started together with clean intermittent self-catheterization. The patient received a rehabilitation program including electrical stimulation for anterior, middle and posterior deltoid muscles, strengthening exercises for the upper extremities, passive and assisted active ROM exercises for the lower extremities and respiration exercises. At discharge, the patient could do functional ambulation at home with a knee-ankle-foot orthosis and walker.

## DISCUSSION

The characteristic pathologic lesions in AS are vertebral body osteoporosis, ankylosis of the apophyseal joints, intervertebral disc calcification, and ligamentous ossification. This process begins as an inflammatory process involving joints that leads to eventual development of granulation tissue, and later, to replacement of subchondral bone and fibrocartilage with fibrous tissue. This fibrous tissue ossifies in time and leads to the "bamboo spine". Interspinous ligaments and ligamentum flavum involvements with ossification of these structures and posterior arch fusion are common (6). Ossification can fuse the lumbar spine and can cause reduced spinal flexibility and stiffness (9).

It is recognized that long standing AS patients are more prone to spinal injury due to the rigidity of the spinal column, osteoporosis, unstable kyphotic postures and vertebral biomechanic changes, even if trauma is minimal (1, 7, 12, 16, 17).

The incidence of spinal fracture in AS is 3, 5-4 times that of the normal population (7, 9). Tico et al. reported that the incidence of traumatic spinal cord injury in AS patients was 2 %. The major mortality rate was high, with a range of 35-50 % (17). Foo et al. found that the mortality rate was 57 %. They also reported that there was a high incidence of alcohol use before the accident, and neurologic deterioration commonly occurred before admission. Associated epidural haematoma was present in 14 % of their patients (8).

Seventy-five percent of all fractures occur in the lower cervical spine (3, 6, 7, 12). Fifth and sixth intervertebral spaces are most commonly affected (12). One of our patients had fracture in the lower cervical spine.

Hyperextension injury is the most common mechanism of acute fracture of the cervical spine (1, 17). Hyperextension in patients with AS can result in fractures through the intervertebral disc, whereas a

flexion injury mechanism causes fractures through the vertebral body. Fractures usually occur in the level of disc space where the ankylosed and rigid spinal column is weakest. Fractures often involve both anterior and posterior spinal elements, making the spine quite unstable and increasing the risk for neurologic deficit (10, 17). Neurologic deficit due to instability is almost three times more frequent than in patients without AS (10).

Minor trauma, including falls is the most common cause of fractures (16). Motor vehicle accidents are also a common cause (17). Other etiologic factors include chiropractic manipulations, cardiopulmonary resuscitation, endotracheal intubations, improper transfers and application of traction devices (9, 10).

Many authors preferred conservative treatment of the spinal fracture in these patients because of the high morbidity and mortality rates, associated with surgery (4, 11). On the other hand Graham et al. suggested that surgery would be indicated in those patients who have neurological deterioration and after failure of reduction with conservative treatment (11). Apple and Anson evaluated 59 AS patients with SCI in a multicenter study. They found no difference between operative and nonoperative groups in neurologic outcome, complications and mortality rates. But nonoperative group had a significantly shorter length of stay and, therefore, a significantly lower cost of care (2). Weinstein et al. suggested that because of high operative complication rate observed, nonsurgical immobilization is the recommended treatment unless spinal dislocation or bone fragment displacement has occured at the fracture site (18). Neurologic deterioration during conservative treatment has been reported because the extreme fragility of the spine makes reduction hazardous, and often application of halo or other traction devices may lead to new fractures or increases neurologic deficit (3). Special techniques and close observation are needed when these patients are placed in traction or halo orthosis (5).

Nowadays spinal treatment recommended for these patients is internal fixation, because of advances obtained in surgical techniques and management in the intensive care unit (10, 17). This stabilization is the preferred method of treatment as it prevents prolonged bed rest and permits earlier rehabilitation (17). Aggressive perioperative pulmonary management is essential to reduce the high morbidity and mortality associated with respiratory complication (10). Multidiciplinary approach is very important in rehabilitation of these patients as it is in all rehabilitation areas.

There are few articles concerning long term functional outcome in AS patients with traumatic spinal cord injury. Murray and Persellin reported good functional recovery in three (43 %) of their seven cervical cord injured patients (14). Ohry and Frankel have illustrated the increased difficulty of rehabilitation of cord-injured patients with pre-existing AS. Such patients tend to recover less well than patients with comparable injuries but with previously normal spine (17). Patients with AS often have weakened ligamentous support due to the inflammatory and ossification process, leaving the paraspinal musculature as a more important stabilizing component (10).

Traumatic spinal cord injury in patients with AS is reviewed in this article. Additional problems such as previous limitation of joint movement, muscle weakness and insufficiency of ligamentous support make the application of rehabilitation programme difficult in this patient population and this affects the quality of life. As patients with AS have a tendency to trauma and as even minimal trauma can cause fractures, patients should be advised to use aids for ambulation when indicated and to avoid drugs or alcohol, which might affect their balance and lead to falls. These patients should also avoid chiropractic manipulations, because even minimal trauma can cause spinal fracture (9). Maintaining spinal mobility with regular exercises, prevention of kyphotic unstable posture, patient education, management of disease activity with medical

treatment and application of appropriate measures for prevention and treatment of osteoporosis are essential in these patients.

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