Neurologic Complications Following Immobilization of Cervical Spine Fracture in a Patient with Ankylosing Spondylitis

Axial traction is widely recommended for stabilization of cervical spine fractures. This procedure may be inappropriate and even dangerous in patients with long-standing ankylosing spondylitis (AS). We present the case of an 80-year-old woman with AS who fell at home and suffered an unstable large C5-C6 fracture/dislocation associated with left-sided weakness and decreased sensation. Medical treatment included placing her neck in a neutral position, despite her preference for neck flexion. This procedure increased her pain and paresthesias; the complications decreased, but did not entirely resolve, when the patient resumed a semi-flexed position. This patient's neurologic sequelae may have been exacerbated by attempts to stabilize her neck in a neutral position. Standard stabilization recommendations should be appropriately altered in some patients with cervical spine AS. [Podolsky SM, Hoffman JR, Pietrafesa CA: Neurologic complications following immobilization of cervical spine fracture in a patient with ankylosing spondylitis. Ann Emerg Med 12:578-580, September 1983.]

INTRODUCTION
Cervical spine fracture is one of the most serious complications of ankylosing spondylitis (AS). When such fractures are accompanied by impingement on the cervical spinal canal with compression of the spinal cord, catastrophic sequelae, including severe neurologic deficits and even death, may follow. Cervical immobilization procedures classically emphasize axial traction and are widely used to prevent these sequelae; nevertheless, many neurologic deficits seen with spinal cord injuries occur after the initial event, either during transit or early in the course of therapy. In some cases, the immobilization and traction technique itself may contribute to subsequent neurological deterioration.

We present a case illustrating the dangers of using axial traction on patients with AS, and suggest the need for extreme caution in dealing with such patients.

CASE REPORT
An 80-year-old woman with a long history of AS was brought to the UCLA Emergency Medicine Center after having fallen at home. The patient complained of neck pain, but not of motor or sensory symptoms. Emergency medical technicians attempted to immobilize her cervical spine with a foam collar, but stopped when her pain increased. During transport, on a standard backboard, the patient began complaining of numbness and weakness in her entire left side.

Transport was completed rapidly, and on arrival in our department she was awake, alert, and conversant. One of the emergency medical technicians held her head in a semi-flexed position, manually stabilizing it. Brief initial neurologic examination revealed mildly decreased sensation of both upper and lower extremities on the left side, with moderate weakness in the same distribution.

The patient was transferred on the backboard to a hospital gurney, and lateral films of her cervical spine were ordered. At that time the physician
tried to place her neck in a neutral position, but this procedure was accompanied by increased pain and paresthesias. The patient was allowed to resume a semi-flexed position once again, with subsequent alleviation of her symptoms. The cervical spine films revealed a significant fracture dislocation of C5-C6, along with 30° dorsal angulation of C5-C6. There was also a diffuse osteoporosis with fusion throughout the cervical vertebral bodies, facet joints, spinous processes, and narrowed discs with calcified ligaments. The sacroiliac joints and lumbar sacral spine were also fused. All these characterize severe AS.

Following completion of neck roentgenograms, a more formal neurologic examination was completed, revealing no sensation or motor power below C6 bilaterally, no rectal tone, and no sacral sparing. Biceps and triceps sensation and motor strength were intact. Plantar reflexes were going bilaterally.

The remainder of the physical examination showed an alert woman with a blood pressure of 110/70 mm Hg, pulse, 60; respirations, 20; temperature, 37°C; left pupil, 4 mm reactive; right pupil post iridectomy, 4 mm nonreactive; normal fundi without papilledema; EOMs intact; ear, nose, throat, chest, heart, and abdominal examinations, normal; and trace bilateral pitting edema of the lower extremities. She had a significant kyphosis of the upper thoracic spine and a spondylitic cervical spine in an angulated flexion.

Neurosurgical consultation was requested, and the patient was placed in Gardner-Wells tongs with 20 lb traction and moved to a Stryker frame, with her neck held in axial traction under fluoroscopic guidance. The patient was placed in the horizontal position following cervical laminectomy. Surin also noted two patients themselves generally hold their necks in moderate degrees of flexion. Osgood et al noted that normal cervical traction is quite hazardous and should be applied in flexion. Janda et al reported a series of six patients with underlying AS of the cervical spine and acute C-spine fractures, of whom five developed severe neurologic deficits. They further radiographically surveyed 1,646 hospitalized AS patients and noted roentgenographic evidence of unrecognized vertebral fractures in five patients. Guttmann, in 1966, found seven patients with AS who developed paralysis in a cohort group of 2,500 AS patients. Radford et al attributed three deaths to cervical spine fractures and subsequent neurologic sequelae in a group of 836 AS patients. Raine reported a series of three AS patients who, after relatively minor trauma, suffered cervical spine fractures. Two of these patients subsequently died; the other developed paraplegia.

The most common mechanism of injury producing cervical spine fractures in AS patients is hyperextension, which may cause fractures even in the presence of very minor or even unrecognized trauma. We may attribute this phenomenon to the severe ligamentous calcification and spinal rigidity seen in extensive AS. The brittleness of the underlying spine also increases the instability of the fracture fragments, resulting in a three-fold increase in neurologic impairment compared to other patients with similar spinal injuries. Death following these injuries is also increased in patients with AS, with the majority of deaths being secondary to respiratory complications during the initial hospitalization.

Numerous reports of neurologic deficits secondary to cervical spine fractures in patients with AS have also been made. The incidence of neurologic sequelae following C-spine fractures also seems to be inordinately high in AS patients. A number of reports have documented that this increased incidence of neurologic deterioration following trauma can in certain instances be related to attempts to immobilize the spine in a neutral position, even though the patients themselves generally hold their necks in moderate degrees of flexion. Osgood et al noted that normal cervical traction is quite hazardous and should be applied in flexion. Janda et al reported a C6-C7 fracture in a patient with AS who became quadriparetic following axial neck immobilization, and recovered only following a laminectomy. Surin also noted two AS patients who developed increasing motor weakness when placed in a horizontal position following cervical spine fracture, when their heads were placed in flexion, this weakness was relieved. Magnacu recorded increased spinal cord pressures when the neck was extended for endotracheal intubation in patients with cervical spondylosis. This pressure was reduced when longitudinal traction was placed with skeletal tongs. This experimental study suggests that in line traction reduces spinal cord pressure in patients with cervical pathology.

Despite these findings about AS, many prehospital systems have recommended cervical spine immobilization, usually with axial traction, following any possible neck trauma.
rarely makes exceptions for AS patients, and no mention of the hazards of neutral axial traction in AS is, to our knowledge, present anywhere in the emergency medicine literature. From 3% to 25% of neurologic injuries associated with cervical trauma occur after the initial event, contributing significantly to the more than 5,000 annual cases of traumatic paraplegia in the United States.26 This makes it clear how important immobilization attempts by prehospital care and emergency department personnel are in the management of these patients.

While axial traction is generally appropriate in most patients with cervical spine trauma, it is notably inappropriate in patients with AS. The diagnosis of AS can be made readily from the initial radiograph of the cervical spine, but avoidance of axial traction even prior to that time should be suggested whenever the patient voluntarily holds his head in a significant degree of flexion. Emergency personnel should not attempt to force the patient into a position of cervical spine neutrality in such circumstances, but should allow the patient to remain in that chosen position. Following documentation of injury on radiography, traction should be placed so as to allow the spine to remain in moderate flexion if AS is documented on the films. Such a procedure may have slowed our patient's decline, and should help prevent unnecessary progression of neurologic findings in other AS patients with cervical spine injuries.

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REFERENCES