



## Ankylosing spondylitis : inadvertent application of a rigid collar after cervical fracture, leading to neurological complications and death

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**Ankylosing spondylitis is a seronegative spondyloarthropathy which predominantly affects the sacroiliac joints and the spine. The spine can become very kyphotic with time. Minor trauma is sufficient to produce a fracture, because of the underlying osteoporosis and because the ankylosed segments constitute large leverage arms. These fractures are unstable because the soft tissues are ossified and also involved in the fracture. Cervical spine fractures need an immobilisation which respects the pre-injury flexion deformity. Inadvertent application of a rigid collar which forces the previously flexed cervical spine into extension may lead to neurological deterioration and even death. We report such a case in a 59-year-old male patient.**

**Keywords :** ankylosing spondylitis ; cervical spine ; fracture ; rigid collar ; quadriplegia.

Inadequate realisation of the nature of the injuries to the cervical spine, ankylosed in flexion, and suboptimal management in the initial care can have serious consequences (4).

### CASE REPORT

A 59-year-old man with ankylosing spondylitis sustained a cervical fracture at home when he fell backwards. His lower cervical spine had absorbed the impact, as he had a pronounced kyphotic deformity. He was able to get up and be fully mobile. He reduced his activity levels at home during the next week, but was still able to use all four limbs and walk.

### INTRODUCTION

The osteoporotic ankylosed spine is vulnerable to fracture after minor trauma (5).

Up to 14% of ankylosing spondylitis patients will experience such a vertebral fracture during their lifetime, in 65% of the cases complicated with neurological deficits. Seventy three percent of these fractures take place at the cervical level, especially at the lower cervical level (2). Furthermore, the ankylosed spine is often kyphotic (2). This makes the management of patients with ankylosing spondylitis and spinal fractures difficult.

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**Fig. 1.** — Plain radiograph (lateral view) of the cervical spine : fracture through the vertebral body C7. Ankylosing spondylitis.

He attended his local emergency department 8 days after the injury. He complained of pins and needles in his hands. Plain radiographs (fig 1) showed a chalk stick fracture through the vertebral body C7, without displacement. The patient was then managed in a semi-rigid cervical collar, which unfortunately extended his neck. A CT-scan and an MRI scan were performed in the collar (fig 2, 3) and showed hyperextension and compression of the cervical cord at the fracture site. The clinical course deteriorated and the patient was taken to the intensive care department. He required intubation and ventilation to support his respiratory function.

On arrival at our institution, he was noted to have a lax anal tone. Posterior reduction, decompression and fixation were performed. Spinal cord monitoring was used throughout surgery. At no time was any signal recorded from surface electrodes or an epidural probe. Fortunately, postoperatively the patient was found to have “only” an incomplete spinal cord injury. He had increased tone in his lower limbs and reduced power, grade 4/5.



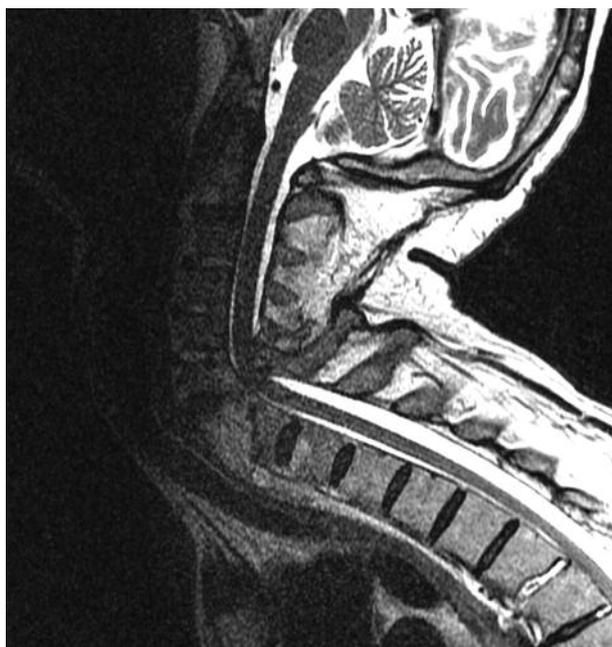
**Fig. 2.** —CT-scan, sagittal view, in a semi-rigid collar. The cervical spine is forced into hyperextension and the vertebral body C7 is distended.

Unfortunately he deteriorated clinically and died of multi-organ failure, 10 days post surgery.

## DISCUSSION

Fractures of the ankylosed cervical spine are not extremely rare. The first challenge is diagnosis, as this is frequently delayed due to patient or doctor factors (1). The reason is that these patients are used to a certain degree of spinal pain. Plain radiographs can miss a thin fracture line. Therefore, a thin-cut (2 mm) multislice CT with 2-D reconstruction is often indicated. MRI allows visualization of ligaments, oedema of the vertebral body, and intraspinal bleeding (2).

The next challenge is the initial management of these injuries. The key factor is the pre-injury position of the patient’s head relative to his torso. Patients without pre-injury deformity can be managed along conventional lines. However, those with deformity are at great risk of neurological injury, if standard immobilization techniques are deployed (3,4). The more because there is instability, due to the fact that the soft tissues are unable to stabilize the fracture, as they are ossified and



**Fig. 3.** —MRI, sagittal view, in a semi-rigid collar. The spinal cord is compressed.

involved in the fracture line. Unfortunately, specific guidance is not provided in trauma courses like Advanced Trauma Life Support (ATLS) (1), for the care of patients with ankylosing spondylitis. A rigid collar, as used in this case, will force the cervical spine, ankylosed in flexion, into the neutral position, resulting in compression of the cord (fig 2, 3) (3). Halo traction necessitates long-term immobilization and leads to complications due to bed rest and subsequent halo fixation (2). Even a halo vest for 10 to 16 weeks is associated with loss of reduction, neurological deterioration and non-union ; it should be reserved for cases where surgical treatment is to be delayed (2). Indeed, there is now a general trend towards operative treatment (2). However, the question if the pathological posture must be corrected simultaneously remains unanswered. Fiberoptical intubation or the use of a

laryngeal mask are recommended. Autotransfusion and hypotension are useful. An anterior-only stabilization is biomechanically inferior to a posterior-only stabilization, but there are no good clinical studies to support this viewpoint. Combined posterior-anterior stabilisation, in this order, with a long instrumentation, is recommended as the standard procedure by several authors because it offers a maximum of stability. Starting surgery in the prone position reduces the danger of neurological deterioration. Spinal decompression is added in case of spinal stenosis, free intraspinal bone fragments, epidural bleeding or spinal cord oedema. Aftercare is possible in a soft C-spine collar.

### CONCLUSION

A history of ankylosing spondylitis should alert clinicians to the possibility of an unstable cervical fracture, even after minor trauma. It is vital to ascertain the pre-injury shape of the patient's cervical spine prior to immobilisation, in order to respect this shape, rather than imposing the routine collar, blocks and tape.

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