Cervical spine fractures with previous extensive arthrodesis

Treatment by triple vertebral body removal plus circumferential arthrodesis

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Introduction

The fractures associated with wide surgical fusion of the cervical spine are scarcely frequent and extremely complex, and they function similarly to fractures in ankylosing spondylitis,[1] to what they add the fact that the cervical spine has been surgically fused, something that increases risks and complicates management further. These types of fractures are associated with great instability and high risk of neurologic injury.[2,3] The aim of this work is to share our therapeutic approach in a complex and infrequent case.

Case

A 67 years old female with medical history of seven-year C5-C7 spinal arthrodesis performed at another institution with an anterior plate; one year after such surgery, due to unfavorable progression of symptoms she had to be subject to revision surgery at another center, where the anterior plate was removed, fusion was extended to a proximal level, and three anterior PEEK interbody cages were added in spaces C4-C5, C5-C6 and C6-C7.

Six years after the latest surgery, she consults at our center because of cervical injury after falling from standing height; she reports bilateral cervicobrachialgia with left dominance, root pain and paresthesia in both upper limbs, plus limitation of motion at the level of the neck. Physical examination showed neck pain at palpation irradiated to both upper limbs, and flexion and right lateralization of the neck; at neurologic examination she only showed hypoesthesia on the left C6 territory; strength and reflexes were preserved and there were no signs of spinal cord involvement. X-rays (Figure 1) and CT scan (Figure 2) show a fracture in the C5-C6 fusion mass, associated with great kyphosis deformity (35°). RMI (Figures 3 and 4) shows posterior ligament involvement and compression of the spinal canal at the level of the fracture, and

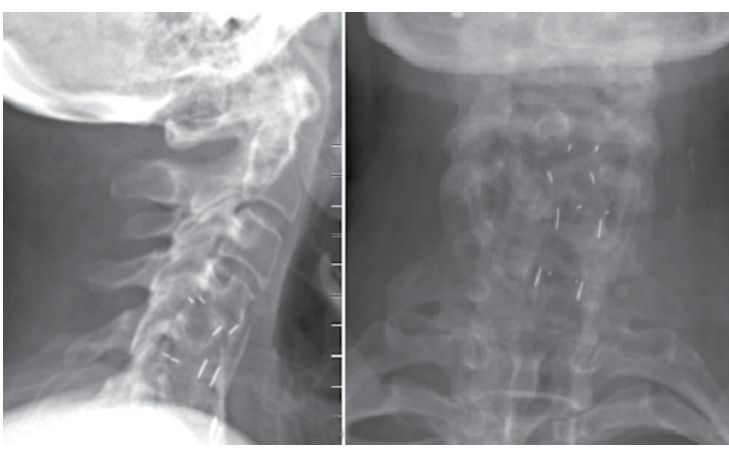

Figure 1. X-rays after the injury.

Conflict of interests: The authors have reported none.

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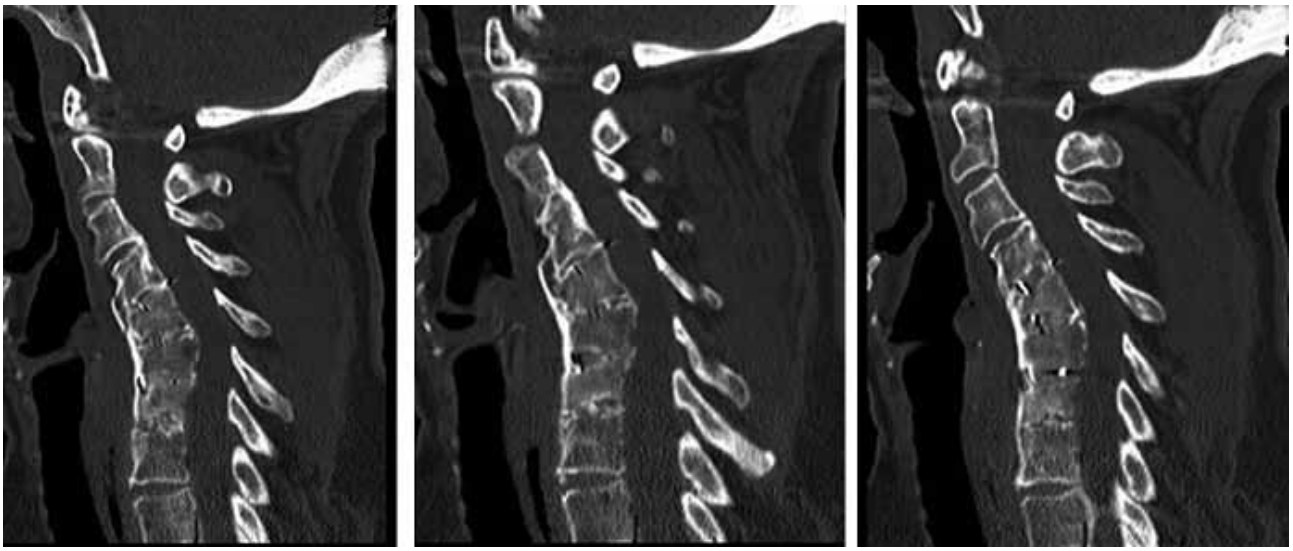

Figure 2. CT scan after the injury.

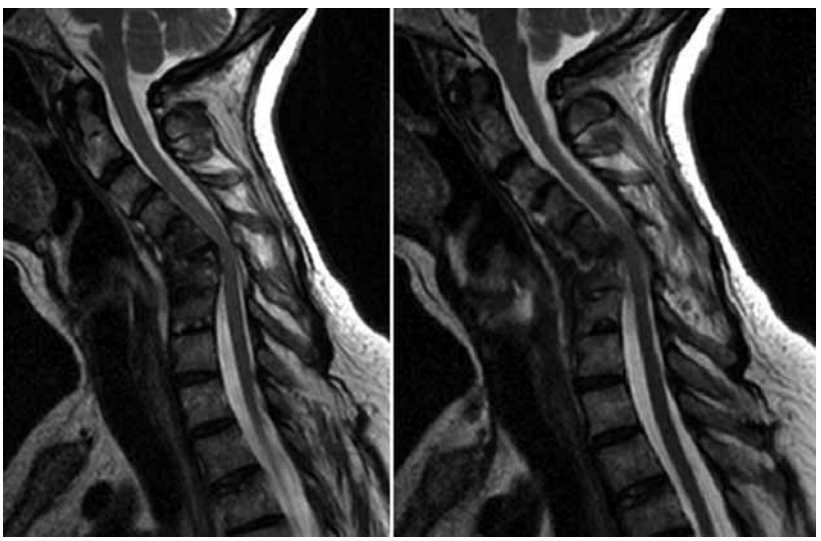

Figure 3. MRI, sagittal section, after the injury.

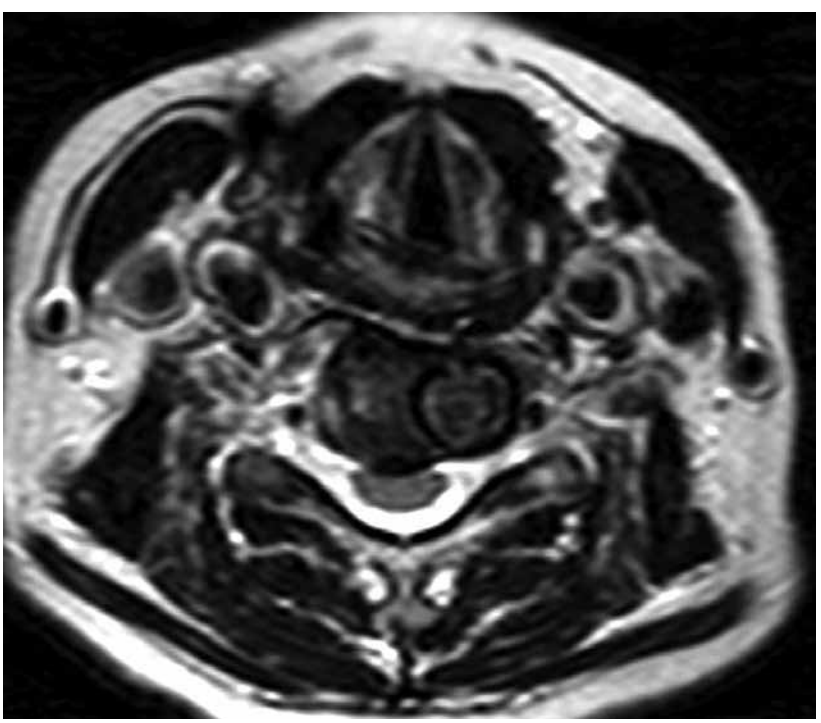

Figure 4. MRI, transverse section, after the injury.

also left lateralization of the interbody cages, which are quite near the ipsilateral vertebral arteria.

The patient was operated on 21 days after the injury. She received decompression, kyphosis reduction and circumferential arthrodesis by double approach in two surgical times (Figure 5).

The first surgical time was carried out by anterior approach and, after the removal of the interbody cages, we verified considerable bone defect in vertebral bodies C4, C5 and C6; so, we performed decompression and kyphosis correction by removal of the bodies at the three levels; then we performed stabilization by cage and plate from C3 to C7. The second surgical time was on day seven after the first surgery; by posterior approach we carried out stabilization from C2 to C7 using lateral mass screws and laminar hook in C2. In both procedures we used autograf taken from the patient's ilium bone.

There were no complications in the immediate postoperative period, and the patient was discharged at day 7 after the surgery, with improvement of symptoms and correction of the previous deformity. At two-year follow-up, she does not show symptoms, and X-rays (Figure 6) and CT scan show that she has kept both anterior and posterior C2-C7 arthrodesis reduction.

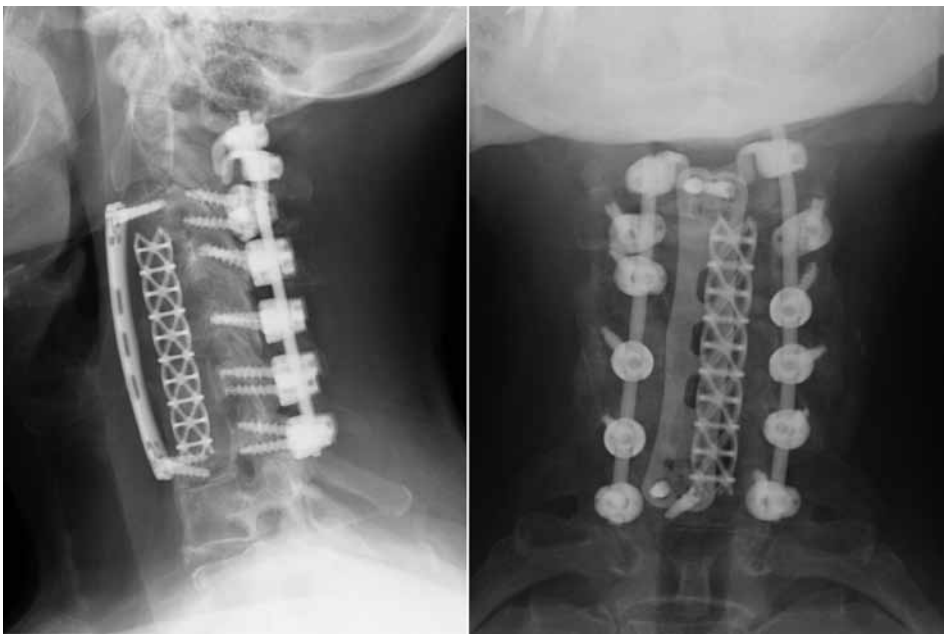

Figure 5. Immediate postoperative X-rays.

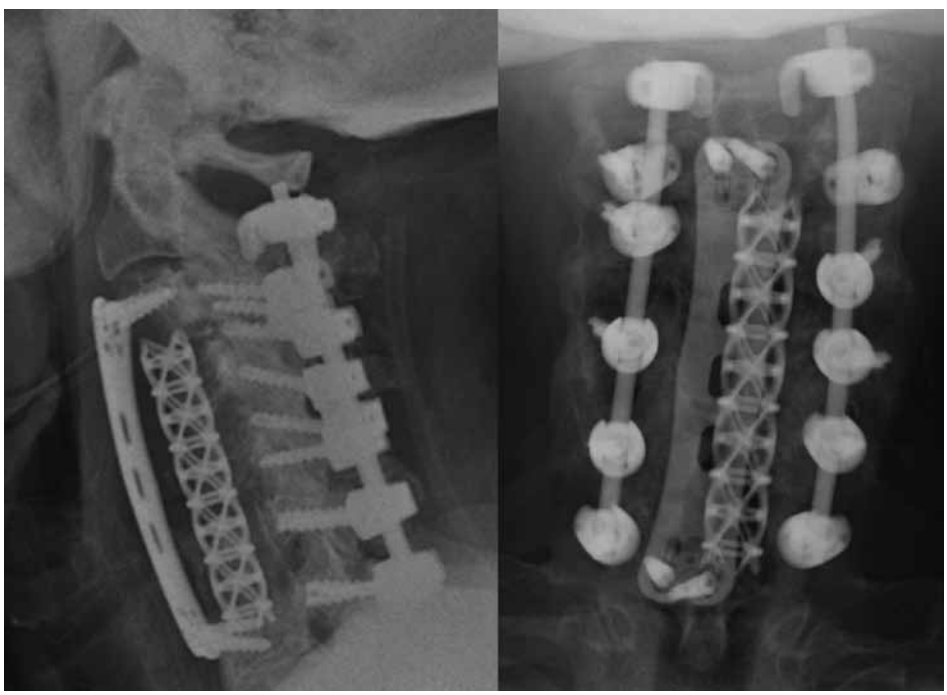

Figure 6. X-rays two years after the surgery.

Discussion

Although there is considerable bibliography about the management of fractures in ankylosing spondylitis fused spines,[4-6] little has been published about management when fractures are in surgically fused spines, what implies that, although treatment can be based on bibliography about ankylosing spondylitis, it is necessary to individualize management because the surgical treatment of these types of fractures is associated with high complication rates,[6-8,] even neurologic injury,[2-9] and death.

It is necessary to take into account that, in case of great previous deformity, it is possible to take advantage of the fracture to correct the deformity apart from treating such fracture.[1] In the case just analyzed, we performed multiple body removal and circumferential stabilization due to the patient's vertebral bone deficit (secondary to the previous surgeries), the anterior-posterior injury, the deformity and the neurologic compression; this way, we got improvement of symptoms, a stable spine and an adequate sagittal balance with no postoperative complications.

Multiple vertebral bone removal is a procedure sometimes used for the treatment of cervical spondylosis, the ossification of the posterior longitudinal ligament, kyphosis and cervical injury. After performing this procedure, it is necessary to give adequate stability, which is ideally achieved using circumferential (anterior and posterior) instrumentation.[10-14] We conclude that treatment by vertebral body removal and circumferential arthrodesis is the right one for the management of the patients that suffer these complex and scarcely frequent types of factures, with neurologic injury, and association with previous arthrodesis and deformity, because it allows the surgeon to perform adequate decompression and stabilization of the spinal cord and, in turn, it corrects previous deformities; it is a revision and rescue procedure whose objective is a stable cervical spine and an adequate sagittal balance.

Moreover, we believe that it is important to publish this type of cases to share surgical approaches due to the scarce bibliography about the management of these patients.

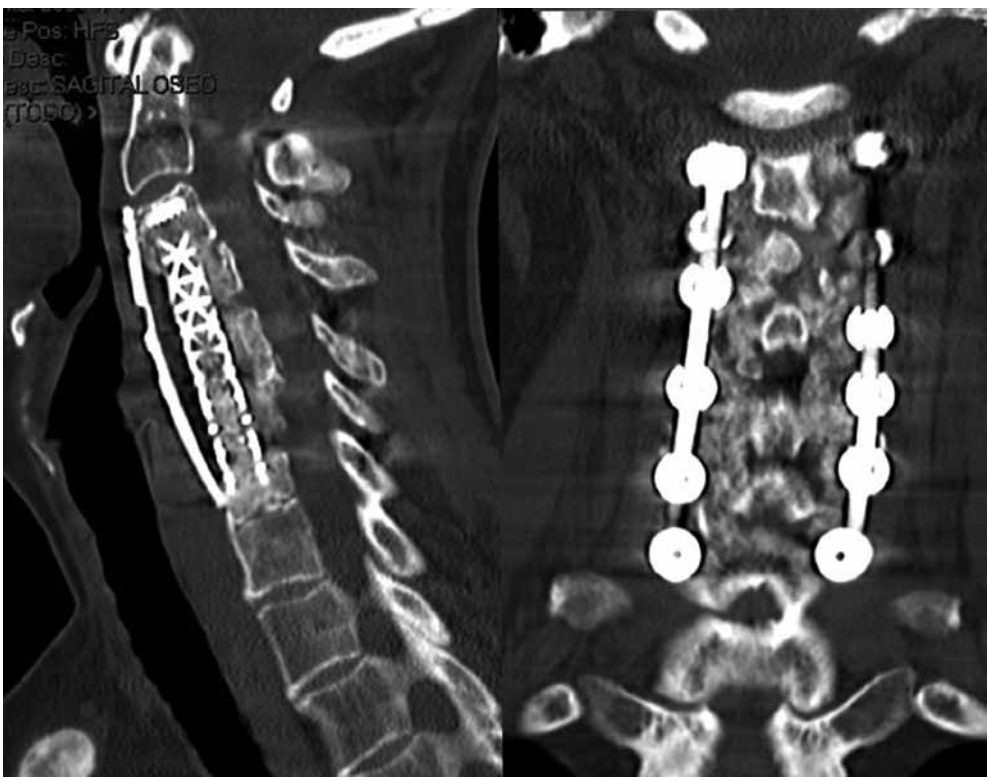

Figure 7. CT scan two years after the surgery.

Bibliography

1. Schneider PS, Bouchard J, Moghadam K. Acute cervical fractures in ankylosing spondylitis. An opportunity to correct preexisting deformity. *Spine* 2010;35(7):E248-52.
2. Jacobs W, Fehlings M. Ankylosing spondylitis and spinal cord injury: origin, incidence, management, and avoidance. *Neurosurg Focus* 2008;24:E12.
3. Grisolia A, Bell R, Peltier L. Fractures and dislocations of the spine complicating ankylosing spondylitis. *Clin Orthop* 2004;422:129-34.
4. Westerveld LA, Verlaan JJ, Oner FC. Spinal fractures in patients with ankylosing spinal disorders: a systematic review of the literature on treatment, neurological status and complications. *Eur Spine J* 2009;18:145-56.
5. Shen FH, Samartzis D. Surgical management of lower cervical spine fracture in ankylosing spondylitis. *J Trauma* 2006;61:1005-9.
6. Heyde CE, Fakler JK, Hasenboehler E, Stahel PF, John T, Robinson Y, et al. Pitfalls and complications in the treatment of cervical spine fractures in patients with ankylosing spondylitis. *Patient Saf Surg* 2008;2:15.
7. Kanter A, Wang M, Mummaneni P. A treatment algorithm for the management of cervical spine fractures and deformity in patients with ankylosing spondylitis. *Neurosurg Focus* 2008;24:E11.
8. Cornefjord M, Alemany M, Olerud C. Posterior fixation of subaxial cervical spine fractures in patients with ankylosing spondylitis. *Eur Spine J* 2005;14:401-8.
9. Thumbikat P1, Hariharan RP, Ravichandran G, McClelland MR, Mathew KM. Spinal cord injury in patients with ankylosing spondylitis. A 10-year review. *Spine* 2007;32:2989-95.
10. Sasso RC, Ruggiero RA Jr, Reilly TM, Hall PV. Early reconstruction failures after multilevel cervical corpectomy. *Spine* 2003;28:140-2.
11. Riew KD, Sethi NS, Devney J, Goette K, Choi K. Complications of buttress plate stabilization of cervical corpectomy. *Spine* 1999;24:2404-24.
12. Singh K, Vaccaro AR, Kim J, Lorenz EP, Lim TH, Howard S. An. biomechanical comparison of cervical spine reconstructive techniques after a multilevel corpectomy of the cervical spine. *Spine* 2003;28:2352-8.
13. Coe JD, Warden KE, Sutterlin CE 3rd, McAfee PC. Biomechanical evaluation of cervical spine stabilization methods in human cadaverical model. *Spine* 1989;14:1122-31.
14. Fessler RG, Steck JC, Giovanini MA. Anterior cervical corpectomy for cervical spondylotic myelopathy. *Neurosurg* 1998;43:257-67.