Vertebral Locking Lesion Following Cervical Spine Fracture in Ankylosing Spondylitis

TOMOYUKI KUROIWA, MD; TOSHITAKA YOSHI, MD, PhD; KYOHEI SAKAKI, MD; HIROYUKI INOSE, MD, PhD; SHOJI TOMIZAWA, MD, PhD; TSUYOSHI KATO, MD, PhD; SHIGENORI KAWABATA, MD, PhD; KENICHI SHINOMIYA, MD, PhD; ATSUSHI OKAWA, MD, PhD

abstract

Spine fractures in patients with ankylosing spondylitis frequently extend to all 3 columns, which can lead to displacement and deformity with severe instability. Cervical spine fractures occasionally cause severe kyphotic deformities, such as chin-on-chest deformities. In such cases, the patients typically exhibit a chronic progression of hyperkyphosis after the traumatic event. This article describes a unique case of ankylosing spondylitis associated with an acute chin-on-chest deformity following a spine fracture due to a vertebral locking lesion.

A 60-year-old man fell while walking and sustained a compression fracture of the C6 vertebra. Two weeks later, the patient acutely developed an inability to raise his head, difficulties with chewing and swallowing, and a horizontal gaze. Radiographs demonstrated a severe kyphosis in the cervical spine with a locking lesion between the anterior wall of the C5 and C6 vertebrae. The patient also presented with neurological impairment in his hands. Because the anterior approach to the spine was anatomically impossible, halo traction was initially applied under a close observation of neurological symptoms. Three days after halo traction, release of the vertebral locking lesion and realignment of the spine were seen. The patient subsequently underwent spinal fusion using a combined anterior–posterior approach.

Postoperatively, neurological dysfunction improved, and solid fusion was confirmed at 6 months. In cases of acute kyphotic deformity following cervical spine fracture in ankylosing spondylitis patients, halo traction followed by circumferential spine fusion is a safe and effective approach for improving the alignment and stability of the spine.

Drs Kuroiwa, Yoshii, Sakaki, Inose, Tomizawa, Kato, Kawabata, Shinomiya, and Okawa are from the Department of Orthopaedic and Spinal Surgery, Graduate School, and Drs Shinomiya and Okawa are also from the Global Center of Excellence Program for International Research Center for Molecular Science in Tooth and Bone Disease, Tokyo Medical and Dental University, Tokyo, Japan.

Drs Kuroiwa and Yoshii contributed equally to this article.

Correspondence should be addressed to: Toshitaka Yoshii, MD, PhD, Department of Orthopaedic and Spinal Surgery, Graduate School, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo, 113-8519, Japan (yoshii.orth@tmd.ac.jp).

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Figure: Lateral radiograph at initial presentation showing vertebral locking (arrow) (A). Sagittal magnetic resonance image at initial presentation (B).
Ankylosing spondylitis is a chronic, progressive inflammatory disease with stiffness that primarily affects the sacroiliac joints and spine. Ankylosis of the spine is characterized by enthesopathy or inflammation and ossification of the ligaments, intervertebral disks, endplates, and apophyseal structures. The ankylosis presents first in the lateral radiograph at initial presentation showing vertebral locking, but the kyphosis occasionally de
ing fracture due to a locked vertebra. The patient required preoperative halo traction to release the vertebral locking lesion, followed by surgery using a combined anterior–posterior approach. The patient gave informed consent for publication.

**Case Report**

A 60-year-old man who had experienced back pain since his twenties slipped and fell while walking and visited a local clinic because of subsequent neck pain. Radiographs revealed a bamboo spine at the level of the cervical vertebrae with a compression fracture of the C6 vertebral body. The patient was subsequently treated conservatively with a soft collar.

The patient was referred to the authors’ institution because he acutely became unable to raise his head 2 weeks after injury. At initial presentation, his chin was in contact with the sternum due to profound kyphosis of the cervical spine. He had difficulties with chewing and swallowing and had a limited field of vision. On neurological examination, the triceps tendon reflex was diminished, and sensory impairment was observed in both hands. Motor weakness of the wrist and digit extensors was observed, and his grasping power was reduced at 20/22 kg. Mild bladder dysfunction and benign prostatic hypertrophy were also present. On laboratory examination, C-reactive protein levels were slightly elevated, whereas all other studies were within normal limits. Spirometry testing showed mild respiratory dysfunction: forced expiratory volume values at 1 second and slightly decreased vital capacity.

Radiographic examination demonstrated a severe kyphotic deformity of the cervical spine (Figure 1A). The cervical spine was locked at the fracture site between the anterior walls of the C5 and C6 vertebrae. The chin-on-chest deformity was not corrected while he was sitting or lying supine due to this vertebral locking lesion. Preoperative magnetic resonance imaging demonstrated anterior compression of the spinal cord at the fracture site (Figure 1B).

Because the anterior approach to the cervical spine was anatomically limited and because intubation would be challenging given the severe chin-on-chest deformity, halo traction was initially applied after admission to the hospital. Halo traction was performed using a weight of 1.5 kg with the pulley positioned in line with his normally flexed spine while neurological function was closely monitored. On day 3, the patient was capable of raising his head. Release of the vertebral locking lesion and realignment of the spine were demonstrated on fluoroscopic observation (Figure 2A). To improve the stability of the cervical spine, the patient underwent spinal fusion using a combined anterior–posterior approach. First, anterior fusion was performed using a hydroxyapatite block with local bone graft and plating. Subsequently, the spine was fused through the posterior approach using lateral mass screws and wiring of the spinous processes (Figure 2B). The surgeries were performed in 1 session under intraoperative neurophysiologic monitoring.

Postoperatively, the sensory and motor impairment of the patient’s hands improved over time. At 6 months postoperatively, solid fusion was confirmed by reconstructed computed tomography scan (Figure 2C). At 1 year postoperatively, the patient was able to return to work with no neurological deficits.

**Discussion**

In patients with ankylosing spondylitis, ossification of the spinal ligaments and intervertebral disks, in addition to spontaneous fusion of the facet joints, transform the flexible spinal column into a stiff rod that cannot bear normal loads. In addition, bone mineral density loss occurs due...
to chronic inflammation, inactivity, and, occasionally, steroid use. Therefore, previous studies have reported that patients with ankylosing spondylitis can be affected by spine fractures after minor trauma, such as a simple fall from standing, or with no history of injury. Patients with ankylosing spondylitis are at a greater risk of spine fracture compared with the general population, and the lower cervical spine is the most frequent site of fracture.

Spinal fractures in patients with ankylosing spondylitis frequently extend to all 3 columns, which can lead to displacement and severe instability of the spine. Because of the pronounced instability at the fracture site, these patients often require surgical intervention. Although conservative treatment options have been described, including prolonged bed rest in traction or in a neck collar or the use of halo traction, they are associated with significant complications. Progressive neurological deterioration due to delayed dislocation has been reported in as many as 60% of the cases treated nonoperatively. Other complications, such as fracture nonunion, pulmonary impairment, and progression of the spinal deformity, have been reported when patients are treated conservatively. Therefore, previous studies support surgical treatment for spinal fractures in patients with ankylosing spondylitis. In the current case, the patient was initially treated conservatively at a local clinic, resulting in acute progression of the kyphotic deformity and neurological deterioration. Thus, surgical treatment was strongly recommended to improve the spinal alignment and neurological symptoms.

Despite the necessity of the surgical treatment, the severe chin-on-neck deformity with the vertebral locking lesion made it difficult to proceed with an anterior approach to the cervical spine. Therefore, the patient was placed in halo traction before surgical intervention to release the locked vertebral arch and allow for spinal realignment. Previous reports have suggested that patients with ankylosing spondylitis and spinal fractures who present with spinal deformities should be initially treated with light cervical traction. Traction with heavy weights should be avoided because uncontrolled distraction of the cervical spine may result in the deterioration of neurological function. Light traction (1.5 kg) was applied to the current patient for 3 days and resulted in the release of vertebral locking without deterioration of neurological function.

Various procedures have been reported for the surgical management of spine fractures in patients with ankylosing spondylitis depending on the fracture site and disruption of the structure: anterior fusion, posterior fusion, or the anterior–posterior combined approach for fusion. Long posterior fixation is most frequently performed if the anterior weight-bearing column is well preserved without fracture gaps. Posterior fixation with extension osteotomy may be an option if severe cervical deformity is not reduced with preoperative traction therapy. However, if the anterior approach is anatomically possible after the traction, a combined anterior–posterior approach can provide acceptable stability in cases with a fracture gap in the anterior column.

In the current case, the spine was fixed with the combined approach because a fracture gap in the anterior column was created with correction of the flexion deformity after preoperative halo traction. As a result, the patient demonstrated acceptable neurological improvement postoperatively and achieved solid fusion at 6 months postoperatively.

**Conclusion**

Patients with ankylosing spondylitis are highly susceptible to fractures secondary to minor trauma. Conservative therapy may result in acute progression of the spinal deformity and deterioration of neurological impairment. In cases of severe kyphotic deformities, patients require preoperative traction to make the anterior approach possible. Because a fracture gap in the anterior column frequently exists after correction of the flexion deformity, a combined anterior–posterior approach can be useful to improve the stability of the spine and achieve optimal functional outcomes.

**References**

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