

MANAGEMENT OF ACUTE CERVICAL FRACTURES IN PATIENTS WITH ANKYLOSING SPONDYLITIS

ANKİLOZAN SPONDİLİTLİ HASTALARDA GELİŞEN AKUT SERVİKAL KIRIKLARIN YÖNETİMİ

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MAKALE BİLGİLERİ Olgu Sunumu

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ABSTRACT

Ankylosing spondylitis (AS) is a type of arthropathy that mainly affects the sacroiliac region and spine. In AS, patients are four times more likely to experience spinal fractures compared to the general population. In this specific group, these fractures often lead to a high incidence of neurological complications. In individuals with AS, spinal fractures are often caused by simple traumas, such as falling from the same level. The ossification of the ligaments and the annulus alters the biomechanics of the spine, acting like a long bone, and reduces its ability to absorb even minor impacts. This article aims to highlight the distinctions in acute cervical fractures among patients with AS compared to fractures in the general population by discussing three different case examples and drawing insights from existing literature.

ÖZET

Ankilozan spondilit primer olarak sakroiliak eklemleri ve omurgayı etkileyen seronegatif bir artropatidir. Spinal kırıklar, ankilozan spondilitli hastalarda genel popülasyona göre dört kat daha sıktır. Bu popülasyondaki kırıklar, yüksek nörolojik komplikasyon oranına sahiptir. Ankilozan spondilit hastalarında spinal kırıklar sıklıkla aynı seviyeden düşme gibi düşük enerjili bir mekanizmadan kaynaklanır. Bu hastalarda spinal ligamanların ossifikasyonu ve anulus fibrozisin kalsifikasyonu, ufak darbeleri bile absorbe etme yeteneğini sınırlayan uzun bir kemik gibi davranarak omurganın biyomekaniğini değiştirir. Bu yazıda, ankilozan spondilitli hastalarda gelişen akut servikal kırıkların normal popülasyondaki kırıklara göre farklılıklarını üç farklı olgu örneği ile literatür eşliğinde tartışarak sunmayı amaçladık.

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Introduction

Ankylosing spondylitis (AS) is a disease affecting the sacroiliac joints and spine (1). Patients with AS face a fourfold higher risk of spinal fractures (SFs) compared to the general population (2). Low-energy traumas frequently cause SFs in these individuals. The ossification of the ligaments and annulus alters the biomechanics and limits the ability to absorb even small impacts (3). This article intends to delineate the unique characteristics of acute cervical fractures in patients with AS compared to the fractures in the general population by discussing three different case examples in light of the literature.

Cases

Case-1

A 43-year-old male with AS presented complaining of diffuse muscle weakness after being punched in the face. Physical examination revealed quadriplegia below C6 and absence of anal sphincter tone. Fractures of calcified longitudinal and posterior ligaments are seen in CT and MR in combination with hyperlordosis and gap formation between C6-C7 (Figure 1). After medical preparations, the patient was operated on the 3rd day of the trauma. Pedicle screws were inserted in C6-C7-T1 on the right and C6&T1 on the left. After connecting the rods, hyperlordosis was somewhat reduced. Then the patient turned into the supine position, and the PEEK-cage was inserted into the gap between C6&C7. Plate-screw fixation of C5-C6-C7 was performed using a midline cervical plate. Anterior plate-screw instrumentation fixed the residual kyphosis (Figure 2). The patient was admitted to the rehabilitation clinic postoperatively.



Figure-1: The first case. **A.** The breakage of calcified anterior-posterior longitudinal ligaments and ligamentum flavum, on the level of C6-C7 at preoperative CT mid-sagittal reconstruction; hyperlordosis formation with ligamentum flavum fracture as the pivot and C6-C7 vertebral vertebrae are seen to diverge. **B.** preoperative sagittal T2 weighted MRI is showing posterior spinal cord compression due to hyperlordosis.

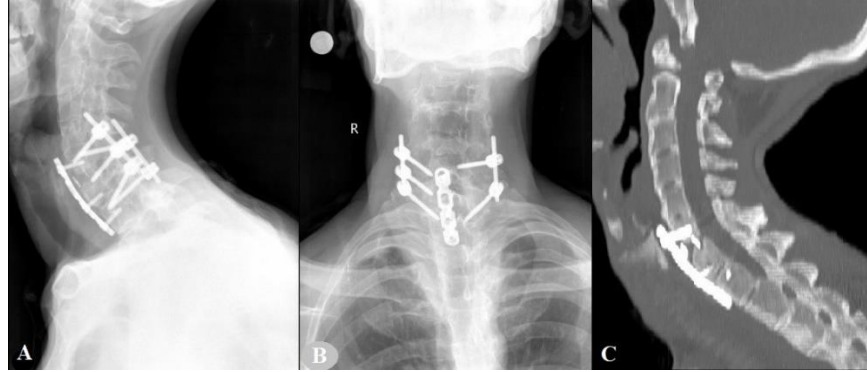


Figure-2: The first case. **A. B.** At postoperative lateral and AP direct cervical radiography, right C6-C7-T1, left C6-T1 pedicle screws, and anterior midline plate screw fixation are seen **C.** At postoperative CT mid-sagittal reconstruction, it is seen that hyperlordosis is fixed, and vertebral alignment has been brought top re-traumatic position with a cervical plate and PEEK cage between C6-C7 vertebrae.

Case-2

A 56-year-old male presented complaining of neck pain and paresthesia in his hands, after hitting his head against the wall and falling from the same level. There was no motor deficit, sphincter tone was present. Although there is no information in his medical history, bilateral facet joint fusions, and calcified anterior and posterior ligaments, which are compatible with the "bamboo spine" appearance typical of AS, were seen in CT. The cervical vertebrae were fractured at the C5-C6 level and dislocated to the anterior (Figure 3). After medical preparations, the patient was operated on the 14th day of the trauma, and dislocation was reduced and stabilized with C5-C6 pedicle screws (Figure-4). The patient was discharged with a recommendation for rheumatological evaluation on the postoperative 2nd day.

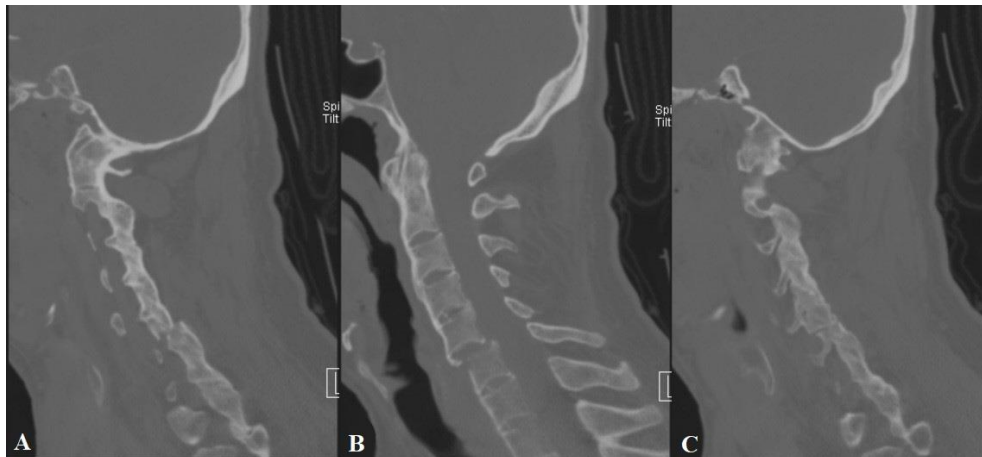


Figure-3: The second case. **A.** CT parasagittal reconstruction passing right cervical facet joint **B.** CT mid-sagittal reconstruction **c.** "Bamboo spine" image at CT parasagittal reconstructions passing left cervical facet joints; fracture line and anterior dislocation are seen on the level of C5-C6

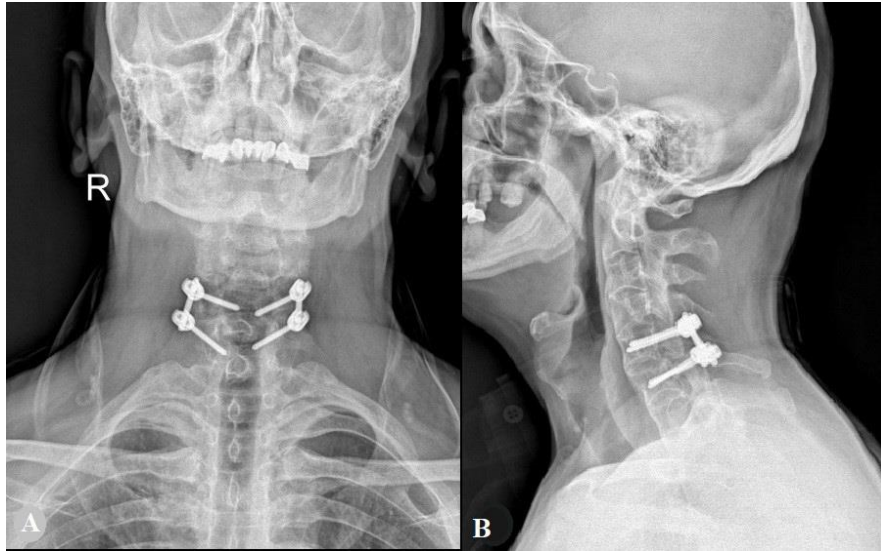


Figure-4: The second case. **A.** AP and **B.** C5-C6 pedicle screw stabilization is seen at lateral postoperative early cervical direct radiographs.

Case-3

Sixty-six-year-old male was resuscitated from cardiac arrest after falling from the same level. He was admitted to the neurology intensive care unit with a preliminary diagnosis of cerebrovascular accident. His medical history (obtained from his relatives) included chronic obstructive pulmonary disease and AS. He had undergone cervical posterior decompression and stabilization some years ago. In the intensive care unit, the patient regained consciousness, and a physical examination revealed left hemiplegia. While there was no evidence in favor of ischemia in the brain MR, it was seen that the odontoid process was fractured and C1-C2 dislocated posteriorly, creating hyperlordosis on CT. In addition to the "bamboo spine" appearance, calcified anterior/posterior longitudinal ligaments between the C6-C7 corpus were broken, as a result of which the C6&C7 separated (Figure-5). In the follow-up, quadriplegia developed, and the patient died 25 days after trauma, without being operated on.

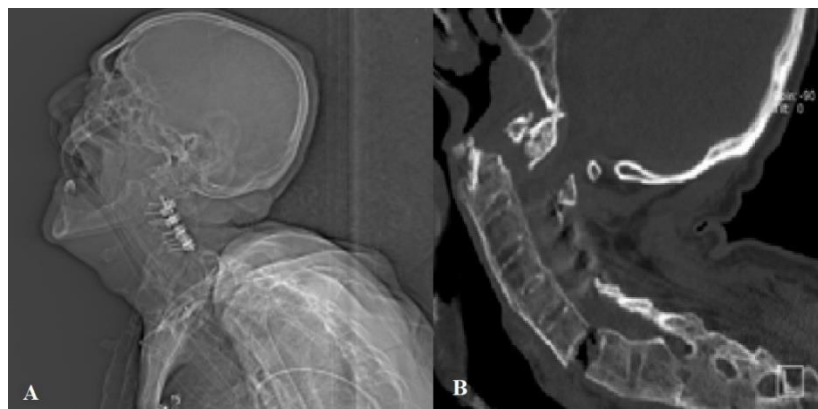


Figure-5: The third case. **A.** Lateral CT "scout" image shows previous C3-C6 lateral mass screw stabilization. **B.** CT mid-sagittal reconstruction shows a "bamboo spine" appearance on the cervical region. The odontoid process has been fractured and posteriorly dislocated. A small part of the fractured atlas can also be seen in front of the C2 corpus. Severe hyperlordosis has occurred in the atlantoaxial joint. Moreover, C6-C7 calcified anterior and posterior longitudinal ligaments

fractured, and C6-C7 vertebrae have been separated. C3-C4-C5 posterior elements appear to have been removed in the previous surgery.

Discussion

AS is a progressive inflammatory condition that mainly affects the skeletal system (1). In the early stage, inflammatory sacroiliitis caused by cartilage destruction and bone erosion is observed, followed by rising vertebral inflammation that develops in apophysis and epiphysis (4). In late-stage AS, erosions in the sacroiliac joint and spine appear to be repaired by ossifying over time. Unlike rheumatoid arthritis, where inflammation causes bone erosion, AS leads to the formation of bones to enthesophytes and syndesmophytes. Ossification of the longitudinal ligament results in the classic "bamboo spine" appearance (5). This rigid spine acts as a long bone and plays a crucial role in the susceptibility of AS patients to SFs.

Patients with AS are at a higher risk of spinal traumas than in the general population since these patients are unable to perform sudden movements, such as turning their heads. Also, they have higher rates of neurological complications. 2/3 of these patients have spinal cord damage when they first present to the emergency room (2). In addition, AS patients with traumatic SFs have a significantly increased risk of death (18-32%) due to their morbidity compared to patients with traumatic SFs but without AS (3). One of our three patients developed quadriplegia below the C6 level, and another patient died. Our other patient had no neurological deficit.

Most of the acute SFs in the AS population occur in the cervical spine (81.2%), especially in the C5-C6 and C6-C7 levels (2). Facet joints in the cervical region make an angle of 45 degrees with the horizontal plane, 60 degrees in the thoracic, and 80-90 degrees in the lumbar region. Accordingly, while the cervical region has greater mobility, movements in the lumbar region are quite limited. It is particularly prone to injuries due to the oblique facet joint angle of the cervical region and the junction in the transition from a more mobile head and neck to a more stable thoracic region. In our patients, fractures were observed at these levels (6).

Approximately 75% of these fractures have a hyperextension mechanism (3), which is primarily due to pre-existing kyphotic deformity. Due to the reduced elasticity of the disc and calcification of the annulus, the fracture can occur at the disc level besides the vertebral corpus (7). In our 3 cases, fractures were passing through the disc levels.

The purpose of the treatment is to restore the patient's pre-injury position and remove the neural compression (8). One of the features that should be considered is that the pre-injury postures of these patients are kyphotic. Extended segmental instrumentation is recommended (9, 10). We performed anterior and posterior stabilization in one of our patients and short segment stabilization in the patient with almost no deformity.

Conclusion

It should be kept in mind that in patients with AS, unstable SFs can develop even with low-energy traumas, can be misdiagnosed easily with plain radiographs, and the fracture line can pass through the disc level. The risk of neurological deficit and mortality is higher than in the general population.

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