

# Zlomi vratne hrbtenice pri ankilozantnem spondilitisu: prikaz primera in pregled literature

## Cervical spine fractures in ankylosing spondylitis: a case report and literature review

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### **Izvleček**

**Namen:** Zlomi vratne hrbtenice pri pacientih z ankilozantnim spondilitisom so pogost vzrok obolenosti in smrtnosti v tej redki populaciji. Ponavadi nastanejo kot posledica delovanja manjše sile, vendar so večinoma nestabilni, zato jih večinoma zdravimo operativno.

**Poročilo o primeru:** Optimalen način zdravljenja je še vedno stvar razprave, vendar verjamemo, da lahko najboljše rezultate dosežemo z uporabo 360° osteosinteze. Predstavljamo pregled literature in primer 48-letnega bolnika z izoliranim zlomom C6, ki je bil zdravljen s 360° osteosintezo z ugodnim izidom zdravljenja.

**Zaključek:** Zlomi vratne hrbtenice pri ankilozantnem spondilitisu naj bodo zdravljeni s 360° osteosintezo, saj lahko s to metodo dosežemo najboljše rezultate zdravljenja.

### **Abstract**

**Purpose:** Cervical spine fractures are a major cause of morbidity and mortality in patients with ankylosing spondylitis. These fractures are usually the cause of minor trauma and unstable in nature and, therefore, should be treated surgically.

**Case report:** Although the optimal choice of treatment remains a matter of discussion, combined antero-posterior or 360° fixation should be performed. Here, a case of a 48-year old male patient with an isolated C6 fracture that was treated with 360° fixation with good results is presented along with a review of the current literature on this topic.

**Conclusion:** Fractures of the cervical spine in ankylosing spondylitis should be treated with a 360° fixation, as this method enables the best treatment results.

## INTRODUCTION

Ankylosing spondylitis (AS) is a seronegative spondyloarthropathy that primarily affects the axial skeleton. Most frequently, AS onset is characterized by inflammation of the sacroiliac joints, followed by inflammation of the intervertebral spaces which, if left untreated, leads to fusion of the spine and the formation of the so-called “Bamboo spine” (1). AS typically affects young males (3:1 male:female ratio) with a peak presentation at 25 years of age (1, 2). The incidence of AS is between 0.44/100,000 persons in Iceland and 7.3/100,000 persons in the USA and Northern Norway, with a prevalence between 0.01% in Japan and 1.8% in Northern Norway (3). The causes of AS have not yet been identified, but it has been established that the human leukocyte antigen (HLA) B27 antigen is present in 90% of patients with AS, while only 6%–7% of individuals positive for HLA B27 develop AS (4).

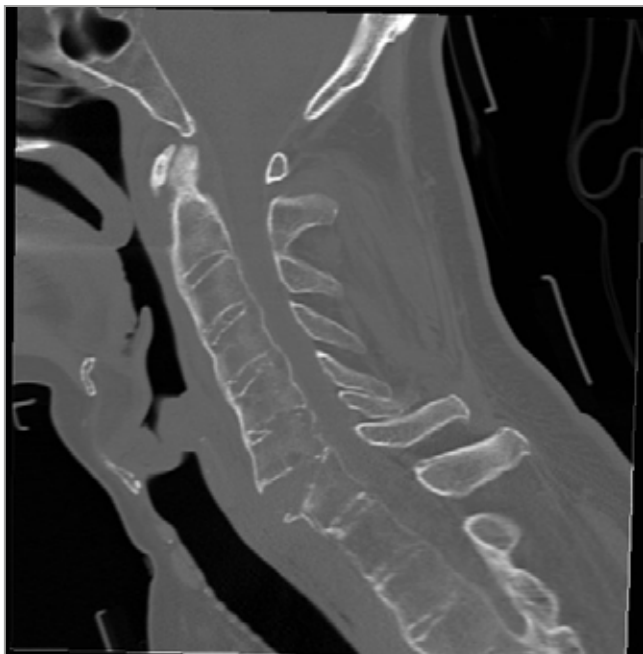
The risk of spinal fractures in patients with AS is higher than in the general population and spinal fractures are among the primary causes of mortality in these patients (2, 5, 6). Patients with AS are more prone to fractures due to the higher prevalence of osteoporosis, the loss of flexibility and ability to absorb impact, and the loss of stability due to kyphotic deformities that affect balance (1, 4). Spinal fractures in AS are often three-column unstable injuries due to the inelastic nature of all spinal structures with a higher risk of spinal cord injury (2, 4, 7). Due to the instability of such fractures and frequent non-unions, these injuries are primarily treated surgically (8). The options for surgical treatment are anterior, posterior, or antero-posterior approaches, or 360° fixation, with the latter becoming the treatment of choice in recent years (9).

The incidence of spinal cord injury in fractures of the ankylosed spine is high at 58%, but improvement in neurological status is observed in 34% of patients and deterioration in 5% (10). The mortality of AS patients with spine fracture is 17%, which is about three-fold greater than in otherwise healthy individuals with spinal trauma (11).

Here, a case of a male patient with AS with an isolated injury to the cervical spine that was treated with a single stage 360° fixation is presented.

## CASE REPORT

A 48-year old patient with AS presented to the Emergency Department following an assault. He was partially amnesic to the assault and complained of head, neck, and upper extremity pain. Plain X-rays of the head, neck, and thoracic spine revealed a suspected fracture of the nose and changes consistent with AS due to the combination of neck pain and AS. Computed tomography (CT) scans of the cervical spine showed a fracture of both the laminae of the C6 vertebrae with minor dislocation of the fragments. During assessment, the patient was circulatory stable without neurological deficits. Surgical stabilization with anterior and posterior fixation was indicated due to the unstable nature of the fracture. After intubation, the spine was adequately reduced manually under radiographic control. The fracture to the cervical spine was anatomically reduced via a left anterior approach and fixated using an angularly stable CSLP plate (Synthes, West Chester, PA, USA) from C5 to T1. Afterward, the patient was rotated into the prone position and the head was fixed with the help of a Mayfield clamp. Fixation with the Axon Posterior Stabilisation system (Synthes) from C3 to T3 was performed through a posterior approach. Intraoperative fluoroscopy showed proper spine curvature and positioning of the fixation materials. Two drains were placed prior to skin closure. After surgery, a Philadelphia collar was placed on the patient. The patient was discharged on post-operative day 12 with no signs of wound infection, minor pain, or neurological deficits. At follow-up at 6 and 11 weeks, and 6 months after surgery, the patient reported no major discomfort and X-rays showed proper material position and good spine curvature with signs of fracture healing. Cervical spine CT to assess fracture healing is planned for post-operative month 9.



**Figure 1:** Sagittal CT image of the C6 fracture in our patient.



**Figure 3:** Sagittal 3D CT reconstruction of post-operative images in the same patient, showing a 360° fixation.



**Figure 2:** Frontal 3D CT reconstruction showing an ankylosed spine with a C6 fracture.



**Figure 4:** Frontal 3D CT reconstruction of post-operative images.

## DISCUSSION

The choice of fixation for cervical spine fractures in AS is still a much discussed topic with no clear consensus reached so far (1, 8, 9, 12). When choosing the proper criteria, surgical treatment of cervical spine fractures in AS can be performed with all three surgical options (13). The anterior approach can be the most problematic, as it is associated with higher rates of implant failure and the need for revision surgery (14). Surgery via the posterior approach is indicated only for fractures with a well-aligned anterior weight-bearing column with no fracture gaps (7). There has been some consensus that due to three-column instability present in most cases, anterior or posterior fixation alone is insufficient, thus 360° fixation is indicated to prevent implant failure and enable early patient mobility (1, 9, 15–19). Another important aspect of surgical stabilisation of spinal fractures in AS is the need for long segment stabilisation due to the nature of the fracture to resemble the biomechanics of diaphyseal fractures (20). This last fact also indicates 360° fixation because the anatomy of the lower cervical spine prevents implantation of long anterior constructs. Other indications for 360° fixation are fractures with an anterior fracture gap due to hyperextension or if correction of a pre-existing kyphotic deformity is also planned (7).

As proposed by Payer, the combined approach has the following advantages: excellent deformity correction,

decompression of the spinal cord, immediate stability, early mobilisation without the need for external immobilisation, and excellent maintenance of correction in the absence of notable neck pain (7).

We propose that surgery should begin via the anterior approach, as this approach usually enables easier anatomical reduction (16). Another reason that we prefer to begin from the anterior side is the fact that frequently the fused posterior elements with ill-defined landmarks make it difficult to localise the entry points for fixation materials (19). Even though external immobilisation is discouraged by some authors, we recommend the use of a Philadelphia collar, as it provides additional stability and does not impair rehabilitation of patients with AS due to previous immobility of the neck.

## CONCLUSION

Fractures of the cervical spine in AS are important causes of morbidity and mortality in this rare patient population. These fractures can be frequently misdiagnosed or missed, therefore a low decision threshold based on CT or MRI is necessary. Such fractures are almost universally unstable and therefore require surgical treatment. In our institution, 360° stabilisation is the treatment of choice, especially for 3-column injuries.

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