

Unusual Combined Fractures of the Axis and Atlas: Case Report

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ÖZET

Atlas ve aksisin nadir görülen kombine kırıklar: Olgu sunumu

Kombine atlanto-aksiyel omurga kırıkları nadir görülürken, farklı kırık şekilleri ile prezante olabilirler. Bu kombine kırıklar, sıklıkla motorlu araç kazalarında ve yüksekten düşme olgularında görülürler. 64 yaşında erkek hasta yüksekten düşme sonrası acil polikliniğimize başvurdu. Nörolojik muayenesi normal olan hastada, yapılan görüntülemeleri sonrasında, atlanto-okspital kombine kırıklar saptandı. Hasta, sekiz hafta süreyle Halovest ile, sonrasında sekiz hafta Philadelphia tipi boyunluk ile immobilize edilerek tedavi edildi. Philadelphia tipi boyunluk travmadan dört ay sonra çıkarıldı. On altı ay sonra yapılan lateral radyografler ve bilgisayarlı tomografide, solid kemik füzyonu izlendi ve instabilite saptanmadı. Bu yazıda; C2 korpus posterior koronal kırığı, antero-inferior gözyaşı kırığı, C1'in bilateral posterior arkus kırığı olan ve konservatif tedavi uygulayarak başarılı olduğumuz bir olgu sunulmuştur.

Anahtar kelimeler: Aksis cisim kırığı, koronale yönelimli aksis kırığı, posterior atlas kırığı, C2 gözyaşı kırığı

ABSTRACT

Unusual combined fractures of the axis and atlas: case report

Combined atlantoaxial fractures are rare and may present in various types. These combined fractures are seen frequently after motor vehicle accidents and falls from height. A sixtyfour years old male patient was admitted to our emergency room after fall from height. His neurological examination was normal. The radiological imaging revealed atlanto-axial combined fractures. The patient was treated by immobilization for eight weeks with Halovest and thereafter for eight weeks with Philadelphia collar. The Philadelphia collar was left four months after the trauma. His lateral x-ray and computerized tomography imaging after sixteen months revealed solid bone fusion and no instability detected. In this study a successful case who has undergone conservative treatment. Coronally orientated posterior corpus fracture and antero-inferior teardrop fracture of the C2 and bilateral fractures of the posterior arcus of the C1 has been presented.

Key words: Axis body fracture, coronally oriented axis fracture, posterior atlas fracture, C2 teardrop fracture

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INTRODUCTION

Combined fractures of the atlas (C1) and axis (C2) constitute 3% of all cervical spine fractures (1). While C1 fractures accompany in 16% of C2 fractures, C2 fractures accompany in 43% of C1 fractures (2,3). Atlantoaxial fractures are frequently seen after motor vehicle accidents and falls from height, resulting in neurological injury more often compared to isolated C1 or C2 fractures (1). These combined fractures are sometimes seen with various fracture types of the C2 and fractures of the posterior arcus of the C1 (4).

Traumatic C2 fractures are not rare in upper cervical spine injuries. These fractures are classified into three groups: odontoid fractures, pars interarticularis fractures resulting in traumatic spondylolisthesis and C2 corpus fractures. C2 corpus fractures are rarely seen (3,5,6). In

their study, Benzel et al. classified C2 corpus fractures into three types: vertical coronal, vertical sagittal and transverse axial according to the orientation of fracture line (7). In this study, we presented a coronally orientated C2 corpus fracture as well as a bilateral posterior fracture of atlas and C2 anterior teardrop fracture.

CASE REPORT

A 64-year old male patient was admitted to the emergency unit with a complaint of a neck ache developed after falling from height. The physical examination showed a skin laceration on the right frontal hairy scalp and a subepidermal hematoma of 4 cm at the mid frontoparietal region. The patient's neurological examination was normal. At the lateral cervical direct graph, a teardrop fracture at the anterior



Figure 1: A teardrop fracture at the anterior part and vertical fracture line at the posterior part of C2 corpus are seen at the lateral direct graph.

part and a fracture line at the posterior part of C2 corpus were observed (Figure 1). The computed tomography (CT) showed a coronally oriented vertical fracture at

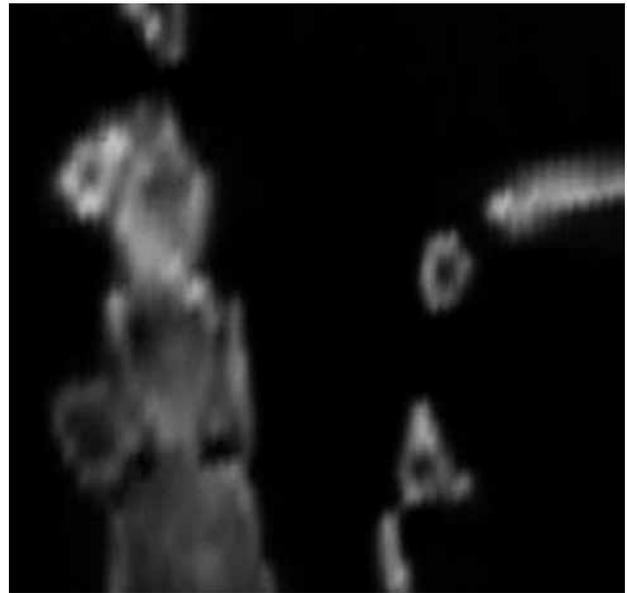


Figure 2: An anterior teardrop fracture and a posterior vertical fracture line are seen at the reconstructed sagittal computed tomography.

the posterior part as well as a teardrop fracture at the anterior part of C2 corpus and a bilateral fracture at the posterior arcus of C1 (Figures 2,3 A-B). A magnetic resonance imaging showed no bone invasion in the spine.

The patient was treated by immobilization for eight weeks with a Halo Vest and for eight more weeks

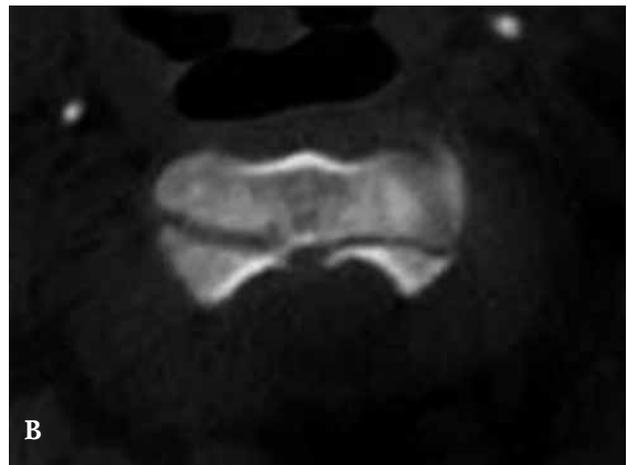
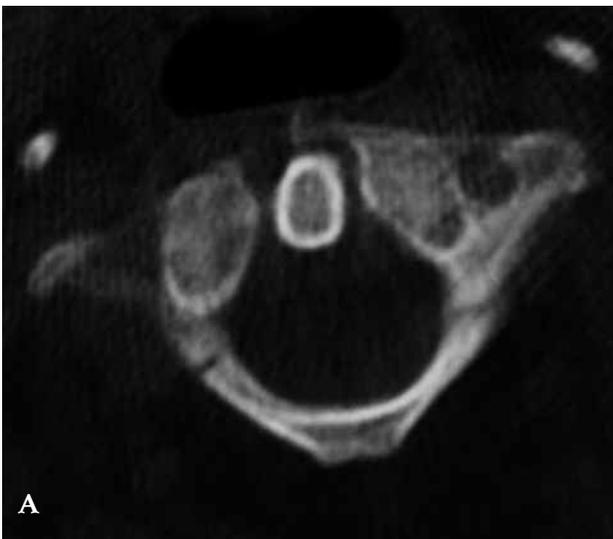


Figure 3 A-B: Bilateral fracture at posterior arcus of C1 and a coronally orientated vertical C2 corpus fracture are seen at axial CT.

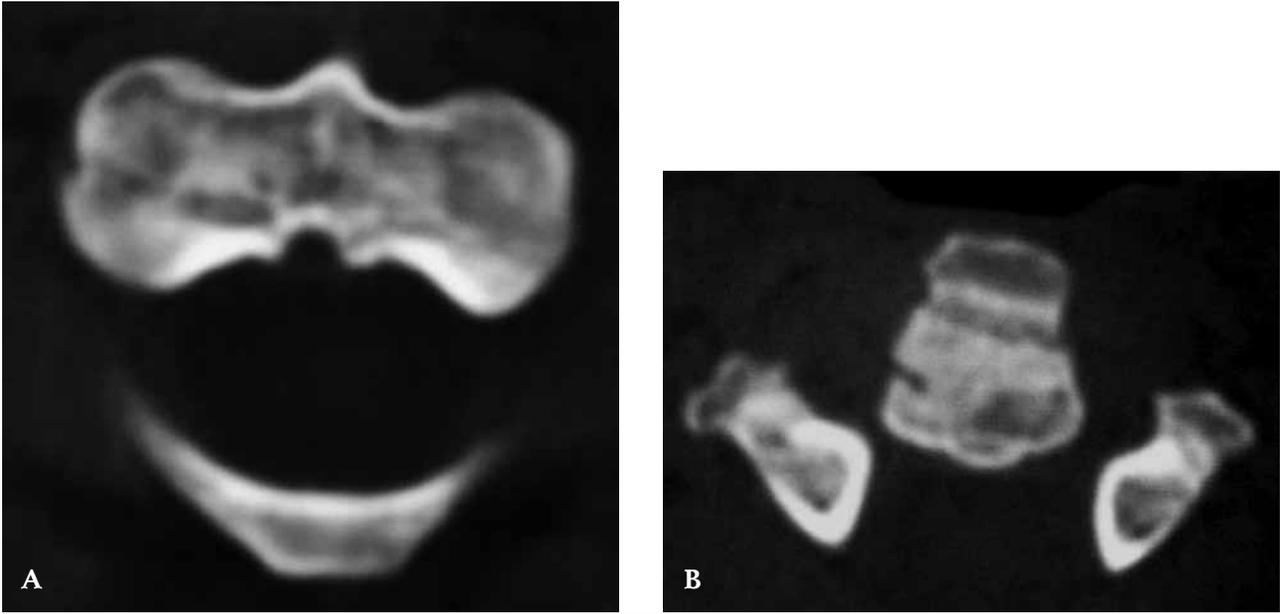


Figure 4 A-B: Bone fusion is seen at coronal fracture and teardrop fracture at control CT performed after sixteen months.

with a Philadelphia Collar. The Philadelphia Collar was removed four months after the trauma. His lateral x-ray and computed tomography imaging, conducted after sixteen months, revealed solid bone fusion and no instability was detected (Figures 4 A-B).

DISCUSSION

The diagnosis and management of complex atlantoaxial fractures are well-described. These are seen often in an elderly population after motor vehicle accidents and falls from height. The observation of fractures of this region with strong ligament and bone support in the elderly population is explained by the tendency of the spine to fracture due to osteoporosis (8-10).

The fractures of C2 vertebra, which has different anatomic features compared to other vertebrae, are divided into various types. Green et al. classified 340 acute C2 fractures with analysis. In this classification, C2 fractures are divided into three classes: Odontoid fractures, bilateral traumatic spondylolistesis of pars interarticularis (Hangman fractures) and other types of fractures (1). According to this classification, C2 corpus fractures are part of other fracture groups. In their study

on 32 C2 corpus fractures, Fujimara et al. divided C2 corpus fractures into four groups: Avulsion fractures, transverse fractures, burst fractures and sagittal fractures. Fujimara et al. divided sagittal C2 fractures into two groups: Fractures beginning from odontoid part and extending to the C2 corpus and fractures extending to the opposite cortex by passing through the C2 corpus (8). Benzel et al. divided vertical fractures of the C2 corpus as coronally oriented and sagittal oriented. In a study with 15 patients, the authors investigated the underlying mechanism in vertical fractures of the C2 corpus and concluded that coronally oriented fractures occurred through four possible ways: Extension with axial load, hyperextension with axial load, flexion-axial load and flexion-distraction. Both C2-3 disc space separation and tear due to hyperextension, and teardrop fractures occurring due to hyperextension of ligaments adhering to the anterior-inferior part of C2 can be seen in hyperextension with axial load mechanism. In our case, there was a teardrop fracture in the anterior-inferior part of corpus in addition to coronal fracture of C2. These findings suggest hyperextension with axial load mechanism in anterior part of the head following a fall. Vertical fractures of the C2 may appear together with severe cerebral and cardiopulmonary problems,

depending on the severity of the trauma. However, in the case that another accompanying spine fracture is absent, neurological symptoms are not usually determined. In their study, German et al. investigated 21 patients with C2 fracture and determined neurological symptoms in only 1 (6%) of 16 patients (5). Additionally, in their literature review, the authors indicated that neurological deficit appeared in four (8%) of 49 cases. These low rates are a consequence of fractured vertebra being prevented from being exposed to extreme sliding by means of its strong ligament structures.

Vertical C2 corpus fractures can be seen together with other bone fractures depending on the fracture mechanism (8). In our case, bilateral posterior arcus fracture of C1 was accompanying. Moratta et al. and Lizuka et al. reported coronally oriented C2 corpus fractures (11,12). While the fracture lines in the C2 corpses of two cases look like the case presented by us, the posterior arcus fracture of C1 and the additional teardrop fracture of C2 corpus are accompanying, in our case.

A review of the reported cases indicates that coronally oriented C2 corpus fractures are to be treated generally with rigid collars. However, surgical treatment is inevitable, particularly in cases that have neurological symptoms with canal invasion and instability. Surgical intervention was performed in only 4 of reported 49 cases with a coronally oriented vertical C2 corpus

fracture (5). The rates of success in conservative treatment are higher enough and if rigid collar is used, no surgical intervention is required. When the literature reviewed, it is possible to see various rigid external fixators and related combinations (13). The Halo Vest is well-known and the best external occipito-cervical fixator. But because it is difficult to use, it is rarely used at the present time. Preferred methods, for patients for whom conservative treatment is advised, are a combination that includes the shorter Halo Vest application followed by the Minerva jacket and Philadelphia type rigid collar. In our case, there were no neurological symptoms and excellent improvement was seen after eight weeks with the Halo Vest and another eight weeks with the Philadelphia Collar. At the sixteen month follow-up, we observed sufficient solid bone fusion without clinical and radiological instability.

CONCLUSION

Although combined atlantoaxial fractures are complex fractures, treatment methods are simple. Usually, they can be treated with external semi-rigid and full rigid orthosis. The type of C2 fracture and the experience of the surgeon can determine treatment choice. While conservative treatment is a good option for patients without neurological symptoms, surgical treatment is inevitable in cases requiring decompression.

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