

TREATMENT OF COMPLETE FRACTURE-DISLOCATION WITH PARAPLEGIA AT THE UPPER LEVEL OF THORACIC VERTEBRAE

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ABSTRACT

Anterior spondyloptosis of upper thoracic vertebral region is rare. In this study, we report our protocol of diagnosis and treatment performed in our clinic in such a case.

Key Words : Fracture- dislocations, Thoracic spine, Paraplegia

ÖZET

ÜST TORASİK VERTEBRALARDA PARAPLEJİ İLE BERABER OLAN KOMPLET KIRIKLI ÇIKIĞIN TEDAVİSİ

Üst torakal vertebra bölgesinin anterior spondiloptozisi nadiren gelişir. Bu çalışmada, böyle bir olguda, tanı ve tedavi protokolümüz sunulmaktadır.

Anahtar sözcükler: Kırıklı çıkık, Torasik omurga, Parapleji

INTRODUCTION

Fractures and fracture-dislocations at the upper thoracic vertebral region occur frequently but anterior spondyloptosis at this region is rare. This level is in close relation with the chest wall, so the violence of trauma must be severe to cause fracture and fracture-dislocation at the upper thoracic vertebral column. According to El- Khoury, the narrow spinal canal in this region is frequently associated with the injuries of the upper thoracic spine(4). By two patients with anterior spondyloptosis in upper thoracic vertebral level, we put in discussion the treatment of this kind of patients in this study.

MATERIAL and METHOD

Case 1: Twenty-year-old male patient was admitted to emergency room with paraplegia because of T5-T6 complete anterior spondyloptosis. According to Frankel classification, it was grade A. The results of other systemic examinations were normal. Proximal vertebral column had fallen down one level to the anterior of distal column in lateral roentgenograms. Dislocation at 6th, 7th, 8th, costotransversal joint and

translation were present in plain roentgenograms. Two dislocated vertebrae were seen in the same level and one in plain roentgenograms. Posterior elements of two dislocated vertebrae were intact. Two dislocated vertebrae were seen in the same plane in CT scanning and this means "multiexposure sign" (Figure 1).

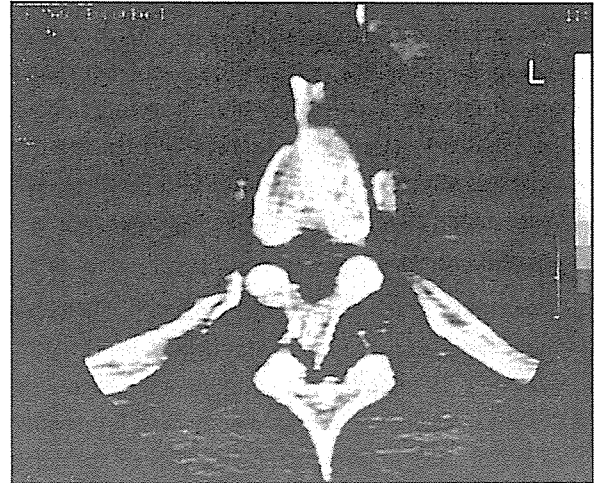


Figure 1. CT scan showing two dislocated vertebrae in the same place.

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MRI couldn't be done. The patient underwent surgical procedure immediately. In operation, reduction with anterior approach was tried but wasn't successful. Halo traction without reduction was applied postoperatively. The patient died 8 hours after the operation from cardiopulmonary arrest.

Case 2: Fifty-two-year-old male patient was admitted to emergency room with paraplegia because of T4-T5 complete anterior spondyloptosis. According to Frankel classification, he was grade A. Clavicle fracture (midshaft), multiple fascial lacerations and scalp laceration about 15 cm at temporal region were observed. The results of other systemic examinations were normal. Proximal vertebral column had fallen down two level to the anterior of distal column in lateral roentgenograms. Two dislocated vertebrae were seen in the same level and one in anteroposterior roentgenograms. Posterior elements seemed to be intact and multiexposure sign was positive. MRI couldn't be done. To stabilize the patient's vital systems, he was stated in ICU for ten days. Halo traction was applied and corticosteroid therapy was begun to release edema and for cytoprotection. After these procedures, the patient underwent a surgical procedure. At the operation, the excision of vertebra was decided with Kostuik's extended posterior approach but was not successful because of massive bleeding. Therefore, insitu instrumentation with pedicle screw and rod system without reduction was applied. Anterior grafting with anterior approach in a second procedure was planned.

DISCUSSION

According to El- Khoury and Bohlman, the upper thoracic vertebra is the level between T1-T10(1,4). However, according to us, anterior instrumentation couldn't be applied to the patient since it is between T1-T6. The distinguishing characteristics of the upper thoracic spine are the presence of the ribs and their articulations. The rib cage adds stiffness to the spine. Because of stiffness, considerable violence is necessary for the produce of fractures or fracture

dislocations. Patients can have ecchymosis and deformity across their backs over the level of spinal injury (2). Hemothorax, pneumothorax, abnormal kyphosis, translation, pleural fluid, paraspinal edema, rib fractures, dislocation of costotransversal joint, increased distance of interpedicular area, sternal fractures, fracture at another level of spinal column (1) and disc hernia could be seen in radiologic examination (1,4). Soft tissue lesions, edema and hemorrhage at the spinal cord can be diagnosed with MRI at best. Mediastinal widening, apical cap and pleural fluid may be attributed to aortic transection (1,4). Upper thoracic vertebral fracture-dislocations are associated with high incidence of paraplegia (2). It means that the spinal cord had been cut out if the posterior elements of dislocated vertebrae were intact. According to Bohlman, in 1985, the major indication for internal fixation and arthrodesis of the upper part of the thoracic spine is complete dislocation. The laminectomised patient, who had kyphosis of more than 40 degrees without arthrodesis, was developed (1). Today, the indication is widened because of the improvement of the surgical techniques. Vertebral excision with costotransversectomy is insufficient for the treatment. It is contraindicated to have Kostuik's extended posterior approach for treatment because it may cause massive bleeding from the arteries and veins which pass through this area.

For the treatment of fracture-dislocation, there are various types of methods:

1. Reduction and stabilization after resection of the vertebrae from distal column at the dislocation with anterior approach: At the upper part of thoracic vertebrae, instrumentation for stabilization must be done with posterior approach. This technique can be performed in the same operation or it can be delayed to a second operation. During this time, halo-traction may be applied to the patient. For stabilization, pedicular screw and rod system were preferred. For the differences of levels with two dislocated vertebrae at the dislocation level, hook system is insufficient for stabilization. In applying the pedicular screw to the

vertebral pedicle, we prefer to have hemilaminectomy at the vertebrae just distal to the dislocation level. This is the best way of getting orientated to the pedicular anatomy. After this procedure, the pedicular screw could be applied to the vertebral pedicle just proximal to the dislocation (neurologically intact). Pleura is so close to the vertebrae at this level that applying the screw laterally can cause pneumothorax or hemothorax which increases the incidence of mortality and morbidity. So the screw must be applied medially to prevent this complications (at the distal part). One level of vertebrae must not be instrumented to have a curve on the rod.

2. Posterior instrumentation after halo-femoral traction (3): Numerous disadvantages of these methods are:

a. Decubitis ulcers, pulmonary and urinary disorders related to long term immobilization,

b. Because of rigid immobilization, we could have some problems in life threatening events like intubation.

c. Economic problems for long time hospitalizations.

3. After early stabilization with halo traction(5), stabilization with posterior insitu instrumentation and anterior fusion with anterior approach.

In this method, some complications may occur: When screws that have been placed in the right thoracic pedicle are advanced beyond the anterior cortical margin of the vertebral body, they can endanger the superior intercostal vessels (T4-T11), the oesophagus (T4-T9), the azygos vein (T5-T11), inferior vena cava (4) (T11-T12), thoracic duct (7,8) (T4-T12). As it is the same in left thoracic pedicle they can endanger the oesophagus (T4-T9), aorta (T5-T12). Anterior advancement of a screw that has been placed lateral to the pedicle causes to exit the vertebral body along the lateral margin. On the left side, they can endanger the lung, segmentary vessels, sympathetic chain (T4-T12), aorta (T5-T10).On the right side, they can endanger lung, segmentary vessels

sympathic chain, azygos vein (T5-T11). When advanced medially, they can endanger spinal cord (7). According to some authors, placement of screws in thoracic pedicles should be attempted only if it is critical to over-all stability of the spine (7). In an acute phase, in spite of the fact that the thorax volume is decreased, insitu instrumentation and fusion for stabilization of displaced spinal segments do not cause any severe respiratory complication (9).

RESULTS

Complete fracture and fracture-dislocation with spondyloptosis of upper thoracic vertebrae is not seen frequently. For that reason, there is not much satisfactory knowledge about the treatment of these cases. Violence of trauma, systemic complications, ascending bulbar edema because of forceful manipulations during the operation, increase the mortality in acute phase. Intraoperative reduction is impossible in patients whose proximal vertebral column had fallen down anterior to the distal column. Applying 52.2 kilograms (6) to the halo or Gardner Wells device is the maximal weights to have reduction at the upper thoracic vertebrae. By our experience, reduction is impossible at this region even by this method. Halo-pelvic traction with original (new) screws can break the resistance of soft tissue (using old used screws decrease the strength as a rate of 1/3) (6). Segment resection at the dislocation level with Kostuik's extented posterior approach is difficult because it may cause massive bleeding. After reorganization of the vascular system, it could be tried.

Posterior stabilization after sufficient resection with anterior approach from the distal part of ptotic level is the only way of reduction. Resection must be done from distal level, because spinal cord is functional at the proximal level of dislocation. Anterior instrumentation is difficult at the upper thoracic vertebrae so posterior instrumentation for stabilization as we think is the best way.

The surgeon must not attempt to an immediate operation in a case with total rupture of spinal cord (posterior elements of anterior dislocated vertebrae

are intact and multiexposure sign). Beginning of the corticosteroid medications to release edema at spinal cord and halo traction for stabilizing the vital systems were applied to the patient. After this, we prefer insitu instrumentation without reduction by pedicular screws and rod system and fusion by anterior approach with bone grafting.

The ideal treatment for complete anterior spondyloptosis is the anatomic reduction. Because of some problems, we get under discussion the treatment methods for these patients.

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