

# Transarticular Screw Fixation in Bilateral Traumatic Facet Dislocation of C6-7 Vertebral Level: A Case Report

## C6-7 Vertebra Seviyesinde Bilateral Travmatik Faset Dislokasyonunun Transartiküler Vida ile Sabitlenmesi: Olgu Sunumu

### ABSTRACT

Bilateral facet dislocations at subaxial levels in a flexion-distraction type trauma are three-column injuries. Early reduction of the locked facets and decompression is critical in preventing progressive secondary spinal cord injury. We present a case of traumatic bilateral facet dislocations treated with transarticular screw fixation. Transarticular screw insertion at the subaxial levels of the cervical spine can be performed safely and easily. The biomechanical strength is adequate.

**KEY WORDS:** Bilateral facet dislocations, Cervical traumatic dislocations, Stabilization of cervical spine, Transarticular screw fixation

### ÖZ

Fleksiyon-distraksiyon tipi travmada subaksial seviyelerdeki bilateral faset dislokasyonları üçlü-kolon yaralanmalarıdır. Kilitlenmiş fasetlerin erken redüksiyonu ve dekompresyonu progresif sekonder spinal kord yaralanmasını önlemek yönünden önemlidir. Biz transartiküler vida fiksasyonu ile tedavi edilmiş travmatik bilateral faset dislokasyonu olgusunu sunduk. Servikal vertebra subaksiyal seviyelerde transartiküler vida yerleştirilmesi kolay ve güvenlidir. Biomekanik kuvvet yeterlidir.

**ANAHTAR SÖZCÜKLER:** Bilateral faset dislokasyonları, Servikal travmatik dislokasyonlar, Servikal vertebra stabilizasyonu, Transartiküler vida fiksasyonu

### Abbreviations

ACDFP: Anterior Locking Screw/Plate Fixation After Anterior Cervical Discectomy and Fusion

ACDFPW: Anterior Locking Screw/Plate Fixation After Anterior Cervical Discectomy and Fusion Combined with Posterior Wiring

ACDFTP: Posterior Transpedicular Screw/Rod Fixation After Anterior Cervical Discectomy and Fusion

CT: Computed Tomography

MRI: Magnetic Resonance Imaging

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## INTRODUCTION

Bilateral facet dislocations at subaxial levels in a flexion-distraction type trauma are three-column injuries that are very unstable and frequently associated with devastating neurological deficits (6,10,11,12). Since bilateral dislocations of the facets compress the spinal cord and nerve roots, early reduction of the locked facets and decompression is critical in preventing progressive secondary spinal cord injury (9,10,15). To achieve this, anterior discectomy, interbody fusion and anterior plating with posterior wiring provide effective stabilization (3).

Transarticular screw fixation for facet dislocations at the middle and lower spine was used successfully by Takayasu in 19 patients under lateral fluoroscopy without any complications (14). The transarticular screw crosses four cortical layers and provides higher stabilization than the lateral mass screw that crosses only two cortical layers (14).

Here we present a case of traumatic bilateral facet dislocations that was treated with anterior and posterior fusion. After an open reduction at the C6-7 vertebral level, we used transarticular screw fixation, anterior discectomy, interbody fusion and anterior plating.

## CASE REPORT

A 51 year-old man who had a car accident was admitted to our clinic. The neurological examination revealed an upper extremity weakness in 3/5 proximal, 2/5 distal muscle strength, paraplegia and anesthesia below the C7 dermatomal level. Deep tendon reflexes were normal at the biceps, but absent at the triceps, patella and ankle. The genital examination revealed no anal tonus and reflex.

Bilateral facet dislocations at the C6-7 vertebral level were seen on X-rays (Figure 1). Computed tomography (CT) and magnetic resonance imaging (MRI) were performed (Figure 2). The patient, who weighed 74 Kg., was immediately placed in Gardner-Wells tongs under local anesthesia. The traction weight was started with 6 kg. and increased gradually to 25 kg. within 12 hours without any reduction.

The patient was taken to the operating room. Under general anesthesia and fluoroscopic control, reduction could not be maintained in the supine position. The patient was then placed in the prone position with a head holder. Under traction of 25 kg., a midline skin incision was performed and the

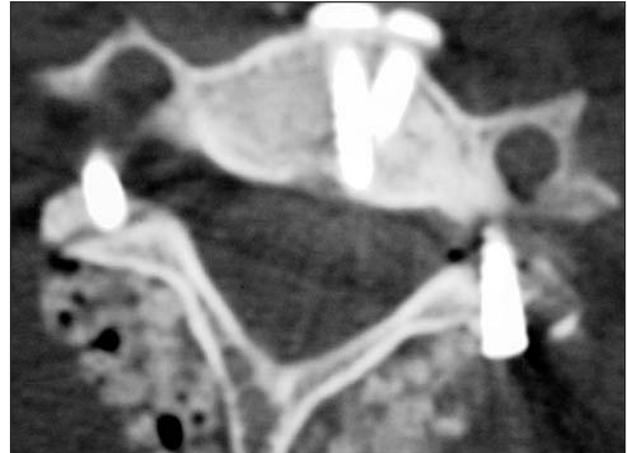
paraspinous muscles were dissected subperiostally. At the C6-7 level, the bilateral facet dislocations were seen and the C6-7 joint reduced. The traction was removed. The lateral border of the lamina was dissected and the insertion point of the screw was located midway between this border and the lateral bone margin of the articular pillar in the mediolateral position. The holes were drilled antero-caudally at the midline of the superior articular process and perpendicular to the facet joint under lateral fluoroscopic guidance. Since the lateral part of the left lateral mass of the C6 vertebrae was broken, we gave a medial trajectory to the screw. The screw length was determined with the depth gauge after penetrating the anterior cortex of the superior articular process. Allograft bony chips were implanted following decortications of the laminae and facets. The patient was then turned to the supine position, and an anterior C6-7 discectomy, interbody cage inserting and anterior plating were performed (Figures 3 A,B and C).



**Figure 1:** Bilateral facet dislocations at the C6-7 vertebral level were seen on X-rays.



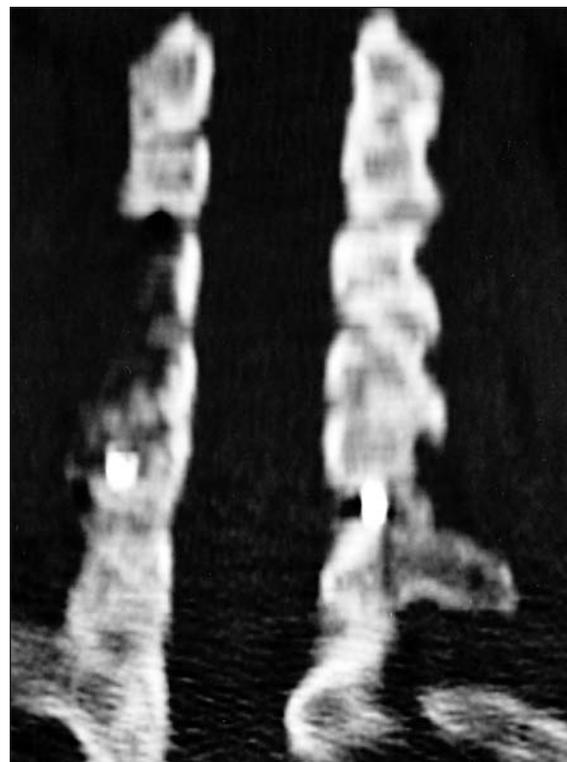
**Figure 2:** Dislocations at the C6-7 vertebral level were seen on MRI.



**Figure 3B:** Postoperative axial CT image of the C6-7 vertebral level.



**Figure 3A:** Postoperative roentgenogram shows axial reconstruction.



**Figure 3C:** Postoperative coronal reformatted CT image at the transarticular screw level.

The patient's sensation improved slightly postoperatively but no motor improvement was observed. Alignment and reduction were performed. At 5th postoperative day, he had respiratory difficulty. A tracheostomy was performed. He suffered from repeated episodes of pneumonia requiring prolonged periods of ventilatory assistance. He developed respiratory arrest and died on the 10th postoperative day.

## DISCUSSION

Bilateral locked facets are caused by hyperflexion of the cervical spine and are usually associated with devastating neurological deficits (6,11,12). The goal of treatment is early decompression, realignment and stabilization of the vertebral column (11,12). Early mobilization of the patient and avoidance secondary injuries of the spinal cord can thus be attained (8). Facet fixation is traditionally performed via wiring or plating techniques after closed reduction. Anterior decompression should be performed if there is a herniated disc fragment at the level of injury (3,4,7,13).

Numerous biomechanical studies have revealed that posterior instrumentation techniques provide greater stiffness than anterior plating (2,4,7,8). Biomechanical stabilities of three surgical approaches were analyzed by Sung-Min Kim et al (7) and facet screws tested as an alternative to the lateral mass screws in the cervical spine (2,5). After anterior discectomy and fusion, anterior locking screw/plate fixation (ACDFP), posterior transpedicular screw/rod fixation (PACDFTP) and anterior locking screw/plate combined with posterior wiring (ACDFPW) procedures were compared. This study has revealed that ACDFTP provides the most effective stabilization (5,7). The spines receiving ACDFTP also had higher stability than the intact spine so this method can also provide a relatively effective stabilization in bilateral cervical facet dislocations (7). Biomechanical comparison of the transfacet versus lateral mass screws showed that transarticular screws have greater pullout strength than lateral mass screws, because they achieve multicortical (four-layer) fixation (1,5,14).

Transarticular screw fixation at subaxial levels was first described by Takayasu. He performed transarticular screws in 19 patients without complications (14). We routinely use transpedicular and lateral mass screws and plating systems in our clinic. Lateral mass screws and plating systems provide adequate stabilization. Transarticular screw fixation can be an alternative method to lateral mass screws at the subaxial cervical spine (1,2) and we think a combination of plating systems is needed. Application of this technique is easy there are some difficulties during surgery in achieving the ideal screw trajectory due to the protuberantia occipitalis externa. Although the transarticular screw technique is easy at the lower cervical levels it is more difficult at the midcervical levels (14).

In conclusion, transarticular screw inserting in the subaxial levels of the cervical spine can be performed safely and easily. The biomechanical strength is adequate. We expect this method to be performed more widely in routine clinical practice in the future.

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