



S017

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**Topic:** Cervical

### **Title: Traumatic Atlanto-Occipital Dislocation: Analysis of 15 Survival Cases with Emphasis on Associted Upper Cervical Spine Injuries**

#### **Abstract**

##### **Purpose**

Traumatic atlanto-occipital dislocation (AOD) is a rare and generally fatal injury. Information regarding associated upper cervical spine injuries that may affect treatment methods, outcomes, and prognosis is limited. This study is to investigate the incidence and characteristics of associated upper cervical spine injuries in 15 survival cases of traumatic AOD.

##### **Materials and methods**

Fifteen patients (11 patients with posterior-type AOD and 4 patients with vertical-type AOD) who survived traumatic AOD were included in this study. Plain radiographs, computed tomography, magnetic resonance imaging, and medical records were reviewed. The incidence and characteristics of associated upper and lower cervical spine and thoracolumbar spine injuries and brain injuries were evaluated.

##### **Results**

Thirteen patients with traumatic AOD (11 patients with posterior-type AOD and 2 patients with vertical-type AOD) showed associated upper cervical spine injuries; the overall incidence was 87% (100% in posterior-type AOD and 50% in vertical-type AOD). In posterior-type AOD, 8 (72.7%) patients had C1 fractures (4 patients had three-part fracture, 3 patients had two-part fracture, and 1 patient had four-part fracture), four (36.4%) patients had C1 lateral mass fractures, two (18.2%) patients had transverse atlantal ligament injuries. In vertical-type AOD, 2 (50%) patients had C1-C2 vertical subluxation with C1 anterior arch horizontal and sagittal split fractures. In posterior-type AOD, 2 (18%) patients had lower cervical spine injuries and 1 (9%) patient had brain injury. In vertical-type AOD, 1 (25%) patient had thoracic spine injury, and 3 (75%) patients had brain injuries additionally.

##### **Conclusion**

Survival cases with traumatic AOD showed a high incidence of associated upper cervical spine injuries and brain injuries. High index of suspicion and careful radiologic examination are needed to investigate the presence of associated upper cervical spine injuries and brain injuries in traumatic AOD, which affects treatment, outcome, and prognosis.

**Keywords:** atlanto-occipital dislocation, survival, tubular retractor, upper cervical spine injuries, brain injuries.



**S018**

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**Topic:** Cervical

**Title: Impact of Anterior Cervical Plating on Serial Postoperative Segmental Motion in Patients who Underwent Single-level Anterior Cervical Discectomy or Corpectomy Fusion**

**Abstract**

**Purpose**

To investigate the differences of serial changes of interspinous motion (ISM) at operated segment up to postoperative-1-year among patients who underwent single-level ACDF without plating (group I), ACDF with plating (group II), and single-level ACCF with plating (group III) and to evaluate the predictive factors affecting radiographic fusion.

**Materials and methods**

The consecutive 510 patients who underwent single-level ACDF or ACCF from C3-4 to C7-T1 at a single center, by three spine surgeons from January 2008 to January 2018 were retrospectively evaluated. The subjects with unavailable medical records and serial dynamic postoperative radiographs, fractures, and infectious causes were excluded. Total 215 patients were enrolled and they were divided into three groups (single-level ACDF without plating: group I, single-level ACDF with plating: group II, and single-level ACCF with plating: group III). To evaluate segmental motion at operated segment, ISM was measured on 150% magnified radiographs at postoperative 3, 6, and 12 months by two surgeons twice. Fusion criteria were defined as ISM < 1mm at postoperative 1 year. The medical records were reviewed for demographic data, diagnoses and what kinds of grafts and implants for fusion were used.

**Results**

Intra- and inter-observer reliability were all in excellent ranges. In all groups, ISM was highest at 3 months after surgery and gradually decreased in postoperative-1-year. Group II showed significant lower ISM among groups and no differences between group I and III. At each follow-up interval, only group II showed significantly lower ISM than two groups, however, group II and III showed significantly reduced ISM at 1 year ( $p < 0.001$ ). In multivariate analysis for predictive factors affecting fusion, plating showed powerful predictive values (Odds ratio, OR: 3.646) and allo-strut graft and auto-strut graft showed a greater odds ratio (1.987 and 1.341) compared to cage.

**Conclusion**

Anterior cervical plating over non-plated, significantly reduces the ISM at the operated segment from early postoperative period and ACCF with plating also showed significant reduced ISM at postoperative -1-year. In multivariate analysis, plating is the most powerful predictive factor for fusion. So, anterior cervical plating is an essential procedure to reduce segmental motion from especially early postoperative period. Our results question the previous reports that non-plated procedures may have a similar fusion rate to plated one.

**Keywords:** Anterior cervical plating, cervical spine, fusion, ACCF, ACDF



S019

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**Topic:** Cervical

**Title: Fate of Machined Allograft Spacers Used for Anterior Cervical Discectomy and Fusion: Classification and Clinical Implication of Postoperative Morphologic Changes of the Allografts**

**Abstract**

**Purpose**

Decrease of segmental height due to cage subsidence may occur after anterior cervical discectomy and fusion (ACDF). When allografts are used instead of cages, additional segmental height loss may be caused by morphologic changes of the allografts themselves. The purposes of this study were to classify the morphologic changes of allografts after ACDF and analyze the clinical impact.

**Materials and methods**

Forty-five patients (72 segments) who underwent single or multi-level ACDF using machined allograft spacers with anterior plating were enrolled in this study. Postoperative morphologic changes of the allografts were classified as 1) no change, 2) bony resorption (>1mm), 3) fracture, and 4) fracture with bony resorption, based on evaluation using computed tomography (CT) images taken in one year after surgery. Subsidence of the allografts (>2mm on coronal CT images), pseudoarthrosis, and sagittal alignments were assessed. Risk factors of bony resorption or fracture of the allografts were evaluated using logistic regression analysis.

**Results**

Classification of the postoperative morphologic changes included 1) no change (31.9%), 2) bony resorption (48.6%), 3) fracture (4.2%), and 4) fracture with bony resorption (15.3%). Major Bony resorption (>2mm) was observed in 19.5%. In comparison between the types of morphologic changes, statistically significant differences ( $p < 0.05$ ) were observed in terms of the following factors: anteroinferior subsidence (1) 4.3%, 2) 34.3%, 3) 33.3%, 4) 27.3%, respectively), pseudoarthrosis (1) 21.7%, 2) 42.9%, 3) 33.3%, 4) 72.7%, respectively), loss of segmental lordosis from immediate after surgery to the final follow-up (1) 1.4°, 2) 3.7°, 3) 3.6°, 4) 4.0°, respectively). Bony resorption or fracture of the allografts after ACDF was significantly correlated with male gender, pseudoarthrosis, and larger anteroposterior size of the allograft.

**Conclusion**

Bony resorption of machined allograft spacers after ACDF is common and may have negative impact on surgical outcomes in terms of subsidence, pseudoarthrosis, and loss of segmental lordosis.

**Keywords:** subsidence, ACDF, allograft, spacer, resorption, fracture