A PRE-OPERATIVE REALIGNMENT OF ATLANTO-OCCIPITAL DISLOCATION

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Disclosures

I have no disclosures
Introduction

• Atlanto-occipital dislocation (AOD) is a devastating and highly unstable cranio-cervical injury
• It is caused by high impact trauma
• AOD accounts for 6-8% of all motor vehicle accident fatalities
• The diagnosis of AOD is challenging to determine on plain x-ray due to difficulty identifying landmarks, and often requires the use of a cervical CT.
• High clinical suspicion is needed to properly diagnose this injury promptly in order to improve patient outcomes.
Case Report

- The patient is a 22-year-old restrained, female driver who was involved in a MVA.
- Patient was endotracheally intubated with inline cervical stabilization and maintained on cervical collar.
- She was taken for an emergency laparotomy
- The patient injuries included
  - bilateral pulmonary contusions with right pneumothorax
  - closed fracture of right transverse processes (L1, L2, L5)
  - liver laceration
- Ten days after the MVA, the patient was awake, and she was tracking and following commands with her eyes. She was withdrawing to pain with the upper extremities; however, she had no movement of her lower extremities.
Case Report Continued

- When neurosurgery was consulted, they found a craniocervical dissociation that was missed on a cervical CT done on admission.
- However, a CT angiogram done ten days after the accident showed realignment of the spine.
- Eleven days status post MVA, the patient underwent an occipital plate placement with par screws at C2, lateral mass screws C3, C4, and C5 for stabilization of the cranio-vertebral junction.
- She was able to move all extremities on command 45 days after the accident.
- The patient had a hospital stay of three and a half months and she was able to walk with assistance on discharge.
Figure 1. A CT of the cervical spine taken the day of the MVA, which had four measurements of the right CCI (0.51 cm, 0.47 cm, 0.49 cm, 0.49 cm) and left CCI (0.95 cm, 0.89 cm, 0.92 cm, 0.97 cm).

Figure 2. A CT angiogram of the neck taken 10 days after the MVA, which had four measurements of the right CCI (0.32 cm, 0.28 cm, 0.28 cm, 0.26 cm) and left CCI (0.07 cm, 0.07 cm, 0.11 cm, 0.07 cm).
Imaging

**Figure 3.** A CT of the cervical spine taken the day of the MVA, which is measuring the basion dens interval (1.77 cm) and the basion axial interval (1.17 cm).

**Figure 4.** A CT angiogram of the neck taken 10 days after the MVA, which is measuring the basion dens interval (0.83 cm) and the basion axial interval (0.82 cm).
Discussion

- AOD is often difficult to diagnose and requires the use of imaging for a proper diagnosis.
- New data has shown that the most sensitive test for this diagnosis is a CT-based occipital condyle-C1 interval (CCI).
- The AOD had realigned and improved in a matter of ten days without surgery.

Imaging
- The coronal CCI on initial trauma was 4.9 mm on the right and 9.3 mm on the left (Figure 1).
- Ten days later the coronal CCI was 2.8 mm on the right and 0.8 mm on the left (Figure 2).
- The BDI was 17.7 mm (Figure 3) compared to 8.3 mm ten days later (Figure 4).
• Ligamentotaxis is a possible mechanism for this realignment through distraction forces transferred through intact ligaments resulting in an indirect decompression of the spinal cord.
• While this is an unusual case, an argument could be made to conduct animal studies in a biomechanical laboratory to determine the role each ligament plays in ligamentotaxis and if AOD realignment can be consistently reproduced in a controlled setting.
• Early aggressive surgical stabilization is associated with improved outcomes after AOD and conservative treatment with external immobilization demonstrated a 30% rate of continued cranio-cervical instability and neurological worsening on follow-up.
Summary

• Diagnosis of AOD can be easily missed, requiring a high index of suspicion and careful analysis of imaging modalities.
• Imaging should always correlate with clinical findings; if there is a discrepancy, the CT needs to be reviewed or MRI study done.
• AOD injuries can potentially realign without surgical intervention.
• Once identified, prompt treatment of AOD results in a more favorable patient outcome.