Pediatric Atlanto-Occipital Dislocation: Treatment with Non-Fusion Using Temporary Internal Fixation C0-C2 with muscle preserving approach. A Case Series and Literature Review.

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Abstract

Study design:

Surgical technical note.

Objectives:

To report experiences and results of muscle-preserving temporary C0-C2 fixation for the treatment of Atlanto-Occipital Dislocation, AOD.

Methods:

AOD, is a rare injury caused by high energy trauma, occurring in less than 1% of pediatric trauma patients. Recommended treatment is C0-C2 fusion which, however, will result in significant loss of mobility in the Cranio-cervical Junction (CCJ), especially C1-C2 rotation. An alternative approach, with the ability of preserving mobility in the C1-C2 segment, is a temporary fixation that allows the ligaments to heal, after which the implants can be removed to regain function in the CCJ joints. By using a muscle-preserving approach and

navigation for the C2 screws, a relatively atraumatic fixation of the CCJ can be achieved with motion recovery after implant removal.

Results:

We present 2 cases of AOD treated with temporary fixation. A 12-year-old boy involved in a frontal car collision, as a strapped back seat passenger, was treated with temporary C0-C2 fixation for 10 months. Follow-up at 11 months after implant removal included clinical evaluation, CT, MRI, and flexion-extension X-rays. He was free of symptoms at follow-up. The CCJ was radiographically stable and he had 45 degrees of C1-C2 rotation.

A 7-year-old girl was hit by a car as she got off a bus. She was treated with temporary fixation for 4 months after which the implant was removed. Follow-up at 8 years included clinical evaluation and MRI in rotation. She was free of symptoms. The ligaments of the CCJ appeared normal and her C1-C2 rotation was 30 degrees.

Conclusion:

C0-C2 fixation without fusion allows the CCJ ligaments to heal in pediatric AOD. By removing the implants after ligament healing, rotation in the C1-C2 segment can be regained without subsequent instability. Both our patients tolerated the treatment well and were free of symptoms at follow-up.

By using minimally invasive muscle-preserving technique and navigation, temporary fixation of the CCJ can be achieved with minimal damage to the soft tissues allowing recovery of almost normal function after implant removal.

Keywords:

Navigation, Atlanto-occipital dislocation, Occipito-cervical dissociation, Cranio-cervical dissociation. Muscle preservation, Motion preservation.