Case Report

CE 1.5 Contact Hours

Atlanto-occipital Dislocation

Internal Decapitation

Jeremy Jordan, MSN, CRNP, CPNP-AC, CCRN
and Steadman McPeters, DNP, CRNP, CPNP-AC, RNFA

Abstract: An atlanto-occipital dislocation, also referred to as internal decapitation, was once thought to be a universally fatal injury as it occurs when the skull separates from the spinal column as a result of ligamentous injury. This publication follows the course of a 3 year old female who experienced an atlanto-occipital dislocation from injury to follow-up. Current imaging and diagnostics are discussed along with criteria for diagnosis and recommended treatment.

KEY WORDS: atlanto-occipital dislocation, AOD, internal decapitation, orthopedic decapitation

INTRODUCTION

A 3-year-old White female patient presented to the emergency department via ambulance after being involved in a motor vehicle collision. Per report from the paramedics on scene, she appeared to be properly restrained in a car seat in the rear driver-side seat; however, the car seat was partially detached from the seat's restraint belt. At the scene, a cervical collar was placed and the patient was stabilized on a backboard for transportation. During the initial survey of the patient, she was noted to be alert, awake, and responsive. Upon arrival to the emergency department, the patient was rapidly assessed. Her neurological exam revealed equal, round, and reactive pupils and intact sensation and movement of all extremities. However, transient changes in levels of consciousness ranging from inconsolable crying to somnolence were noted. A head and cervical CT image was obtained, which demonstrated no fracture, bleed, or other abnormality. Due to the patient's changes in levels of consciousness, the decision was made to transfer to the Pediatric Intensive Care Unit (PICU) for close monitoring. Upon arrival to the PICU, initial assessment of the patient revealed a persistently somnolent level of consciousness and decreased movement of the right upper extremity and right lower extremity, which differed from the initial exam in the emergency department. Because of this change, an MRI of the head and cervical spine was obtained. The MRI revealed separation of the atlanto-occipital joint along with rupture of tectorial and alar tendons.

Jeremy Jordan, MSN, CRNP, CPNP-AC, CCRN
Adjunct Instructor, School of Nursing, University of Alabama at Birmingham, Birmingham, AL.
Steadman McPeters, DNP, CRNP, CPNP-AC, RNFA
Instructor and Dual Option Pediatric Nurse Practitioner Specialty Track Coordinator, School of Nursing, University of Alabama at Birmingham, Birmingham, AL.
The authors have declared no conflict of interest.
Correspondence: Jeremy Jordan, MSN, CRNP, CPNP-AC, CCRN.
E-mail: jordanjd@me.com
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MANAGEMENT AND OUTCOME

After pediatric neurosurgery and orthopedics were consulted, the patient was diagnosed with an atlanto-occipital dislocation. The patient was immediately taken to the operating room for stabilization. Surgical screws and a plate, coupled with autograft bone, were used to stabilize the atlanto-occipital joint. An MRI was obtained immediately postoperatively, which demonstrated satisfactory stabilization of the joint. The patient was then admitted back to PICU for further monitoring. Upon emergence from anesthesia, the patient demonstrated no changes in levels of consciousness, and her neuromuscular exam was normal and demonstrated 5/5 strength, 2+/4 deep tendon reflexes, and normal sensation in all four extremities. The patient remained in the PICU overnight and was transferred to the orthopedic floor the next day. Per report, during the rest of the hospitalization, the patient demonstrated no neurological, sensory, or musculoskeletal sequelae.

DISCUSSION

An atlanto-occipital dislocation (AOD), also referred to as internal decapitation, was once thought to be a universally fatal injury as it occurs when the skull separates from the spinal column as a result of ligamentous injury. Abnormal basion–ondontoid alignment and posterior or anterior dislocation of the atlas are diagnostic of an AOD. The diagnostic tool is usually

magnetic resonance imaging. Because an AOD is a ligamentous injury, it is usually overlooked on CT and not discovered until the patient has an MRI, as seen in Figure 1. This type of injury is usually the result of a high-impact trauma (Astur et al., 2014). However, reports of AOD occurring as a result of airbag deployment in low-impact motor vehicle collisions have also been described (Saveika & Thorogood, 2006). Atlanto-occipital dislocation was first described in 1908; however, the first survival was not reported until 40 years later (Farthing, 1948).

The tectorial membrane and alar ligaments are the most important ligaments for craniocervical stabilization and are also the most commonly injured ligaments in an AOD. The injury to these ligaments and the resulting instability of the craniocervical joint, which leads to brain stem and spinal cord injury, is the cause of death in AOD (Klimo, Ware, Gupta, & Brockmeyer, 2007). Because children have immature spines, larger head-to-body ratios, flatter atlanto-occipital joints, and weaker, more flexible ligaments, they are at a higher risk for AOD (Astur et al., 2014).

Current management of AOD includes halo immobilization and/or spinal fusion. Some experts suggest that halo immobilization is best practice for infants and younger children because of their increased potential for healing ligamentous injuries (Hosalkar et al., 2005). Others suggest that posterior occipitocervical fusion with rod-wire or screw construction is best practice as it provides stability to the craniocervical joint (Astur et al., 2014). In either close observation of the patient in an intensive care setting is recommended, as major vessel injuries, such as the carotid and vertebral arteries, have been reported in AOD.

The most common and devastating sequelae of AOD are the neurological impairments caused by injury to the brain, brain stem, or spinal cord. However, with prompt diagnosis and treatment, Labbe et al. (2001) report that only 55% of pediatric patients have persistent neurological deficits as a result of this once invariably fatal injury.

It is often the nurse's assessment and notation in the change of the patient's neurological or neuromuscular status that is first step in the diagnosis and treatment of an AOD. Therefore, it is important for nurses to be aware of the potential for this type of injury in pediatric patients involved in traumas.

FIGURE 1. MRI demonstrating AOD with associated increased basion-dental interval.

References

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