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Case Report

Atlanto-Axial Dislocation with Bilateral Vertebral Artery Transection

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Abstract

Traumatic atlanto-axial dislocation is an uncommon injury with high mortality. Blunt vertebral artery transection is also rare and is universally fatal. We report the clinical and radiographic findings of a case of traumatic atlanto-axial dislocation with bilateral vertebral artery transection, an injury rarely seen in the hospital. We also review the literature on the incidence and association of these injuries with emphasis on difficulty in diagnosis and need for a high index of suspicion to allow for attempts at intervention to prevent permanent neurologic damage. A 20 year old male was struck by a car and presented to our level I trauma center. Following initial resuscitation, he underwent neck CT angiography which revealed the injuries. These findings are incompatible with life and care was withdrawn shortly after the diagnosis was made.

Case Report

A 20 year old male was struck by a vehicle at approximately 50 miles per hour. He was found unresponsive by EMS and cardiopulmonary resuscitation was initiated. Aggressive resuscitation continued until his arrival at a level I trauma center. He was intubated, intravenous access was obtained and he was noted to be in ventricular fibrillation. A single 200 joule counter-shock was given; he converted to sinus rhythm with a palpable pulse. Radiograph of the chest revealed small bilateral hemothoraces; the pelvis radiograph was negative. FAST exams were negative times 2 and he remained hypotensive despite having a CVP of 12-14. He was started on dopamine, followed by levophed, and received blood transfusions. There was no obvious source of blood loss. Once stabilized, he underwent CT scanning. A CT scan of the head revealed minimal injury, but the CT angiogram of the neck revealed a greater than 2 cm dislocation of C1 and C2 with bilateral contrast extravasation from his vertebral arteries (Figures 1 and 2). The injury was determined to be incompatible with life, and care was withdrawn with his family at bedside. Consent for release and use of the patient's information was obtained from the next of kin in ac-

cordance with our institutions guidelines.

Discussion

Traumatic atlanto-axial dislocations (AAD) represent the loss of the normal anatomic articulation between the first and second cervical vertebrae. The injury is uncommon in that AAD accounts for 0.7-2.7% of all cervical spine injuries [1,2]. Studies of fatal cervical spine injuries have shown that 26% to 33% of all deaths from traumatic cervical spine injury are attributable to AAD [2]. The upper cervical spine is particularly vulnerable to injury because of its relative high mobility, due to the flexibility of the dens of C2 articulating with C1. This relationship accounts for over 50% of all cervical spine rotation [1,3,4]. AAD from a blunt traumatic event is due to force on the neck that causes a disruption of the transverse ligament [3] and is rarely seen in the emergency department due to its lethality and difficulty in diagnosis. Many patients die early due to cardiorespiratory failure, low cerebral blood flow, spinal cord injury, or other severe associated injuries due to the close proximity of the vertebral arteries and medulla [1]. A high index of suspicion is necessary for rapid diagnosis, particularly with hemodynamic

instability and no apparent source of hemorrhage.

The incidence of vertebral artery injury in blunt trauma is estimated to be 0.20-0.77% [5,6] and is associated with a mortality of 8-18% [6,7]. Cervical spine injuries are a risk factor for blunt vertebral artery injuries and are found in 71% of patients with blunt vertebral artery injuries [7]. Biffi, et al found that cervical spine injury was the only independent risk factor for blunt vertebral injury [7]. This group recommends that all patients sustaining cervical spine injury should undergo screening for blunt vertebral injury. Our patient injured the foraminal segment of his vertebral arteries, which is the portion that ascends cranially from C6 to C1 in the foramen transversarium. This is one of the most vulnerable arterial segments to injury due to its close proximity to osseous structures [6]. The typical clinical presentation is of a delayed neurologic deficit that isn't commonly associated with cervical spine trauma. This includes altered consciousness, dysphasia, dysarthria, diplopia, and nystagmus. Several cases of vertebral artery dissection associated with atlanto-axial dislocation have been reported, [1,5,8] however the majority of reports of vertebral artery transection are associated with penetrating trauma and some have been treated successfully via endovascular techniques [9-12]. Kobernick and Carmody reported a case of a 22 year old male with unilateral vertebral artery transection following a motorcycle crash [13]. Endovascular management of the transected vessel was performed, however the patient died approximately 12 hours into his hospitalization. Blunt transection of the vertebral artery, a grade V injury, is nearly universally fatal [6] with no cases of survival with complete transection reported. Even relatively large series of blunt vertebral arterial injuries report no patients with complete transection further suggesting both the rarity and lethality of these injuries [7].



Figure 1. CT angiography revealing severe inferior disassociation of C2 with respect to C1 of more than 2 centimeters. There are ac-

tively bleeding bilateral vertebral arteries at the level of C2.

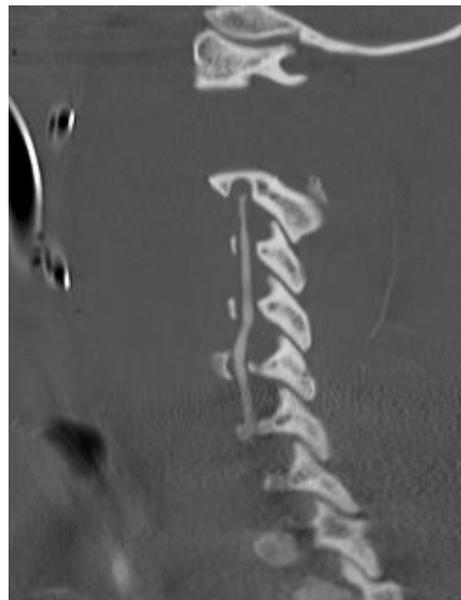


Figure 2. Sagittal view of CT angiography revealing severe atlanto-axial disassociation with an intact vertebral artery to the level of C2 with blush of contrast at the level of C2.

We present a case where the CT imaging reveals a dramatic atlanto-axial dislocation with bilateral vertebral artery transection (Figures 1 and 2). This is a rare and highly lethal injury with few case reports. This patient's injuries were incompatible with life and care was withdrawn shortly after discovery of the injuries. The deep location of the vertebral artery makes injury to it in blunt trauma rare and challenging to detect and manage. Many cervical spine CT scans are performed without contrast, further delaying the diagnosis making it even more difficult. Early recognition and diagnosis of this rare injury is vital even in the severely ill patient to allow for efforts to prevent permanent neurologic damage, particularly in a hemodynamically abnormal trauma patient without a source of hemorrhage.

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