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Right Vertebral Artery Transection With a Vertical Distraction of C5-6: Case Report of a Patient Survival

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Abstract

Spinal column injuries are very commonly diagnosed in the multitrauma population, and extensive distraction injuries are often fatal due to cerebrovascular injuries or spinal cord injuries. We present a 62-year-old female who presented after an MVC with a 2-cm vertical distraction injury of C5-6 with a right vertebral artery transection and left vertebral artery dissection. She received multidisciplinary treatment which resulted in her survival, albeit with severe neurologic deficits. We challenge the current literature that suggests a blunt vertebral artery transection is 100% fatal.

Keywords

vertebral artery transection, bilateral vertebral artery injury, vertical cervical distraction, blunt cerebrovascular injury

Approximately 226 000 spinal column injuries occur each year worldwide, with over 150 000 reported cases in North America alone.[1] Due to the increased mobility of the subaxial cervical spine, it is commonly injured with the following most common patterns of injury: compression-flexion, distraction-flexion, and compression-extension. The stability of the cervical spine is largely dependent on the ligamentous attachments: the ligamentum flavum, anterior longitudinal, and posterior longitudinal ligaments; and extensive distraction injuries often lead to complete cord transection and death.[2] We present the case of a 62-year-old female involved in a motor vehicle collision with a 2-cm vertical distraction injury of her cervical spinal cord at C5-6 who survived with moderate neurologic deficits.

A 62-year-old female was involved in a motor vehicle collision with ejection and loss of consciousness. She was intubated en route by EMS personnel and presented as a GCS 3T with hemodynamic instability; she received 3 L of crystalloid, 5 units of packed red blood cells, and 2 units of FFP. She underwent a CT angiography of the cervical spine, demonstrating a 2-cm C5-6 vertical distraction injury and concern for bilateral vertebral artery injuries.

The neurosurgical group was consulted; they expressed concern for complete cord transection considering the distraction height between C5-C6 and persistent GCS 3T. Approximately 4 hours after arrival, her mental status improved to GCS 11T with movement in all four extremities; she had two-fifths motor function on the left side and one-fifth motor on the right side with intact sensation throughout her body. She was admitted to the trauma surgical ICU with vascular surgery and interventional radiology consultations and underwent a cerebral angiography on hospital day #2.

Her angiography demonstrated a complete transection of the right vertebral artery at the V2 segment with mild distal reconstitution and a focal dissection of the left vertebral artery at the V2 segment with patency to the basilar artery. She had patent common, internal, and external carotid arteries bilaterally, as seen in Figure 1 . The neurosurgery and neurointerventional radiology teams discussed her case and started a fixed-rate heparin drip at 500 units/h to prevent thrombosis at her left vertebral artery dissection and to also prevent complete occlusion of her posterior circulation.

Further discussions between the teams determined that her right vertebral artery would be embolized at the distal and proximal transection sites to prevent any further hemorrhage. The heparin drip was stopped, having received anticoagulation for 29 hours. She underwent angiography on hospital day 6, with successful coil embolization of the

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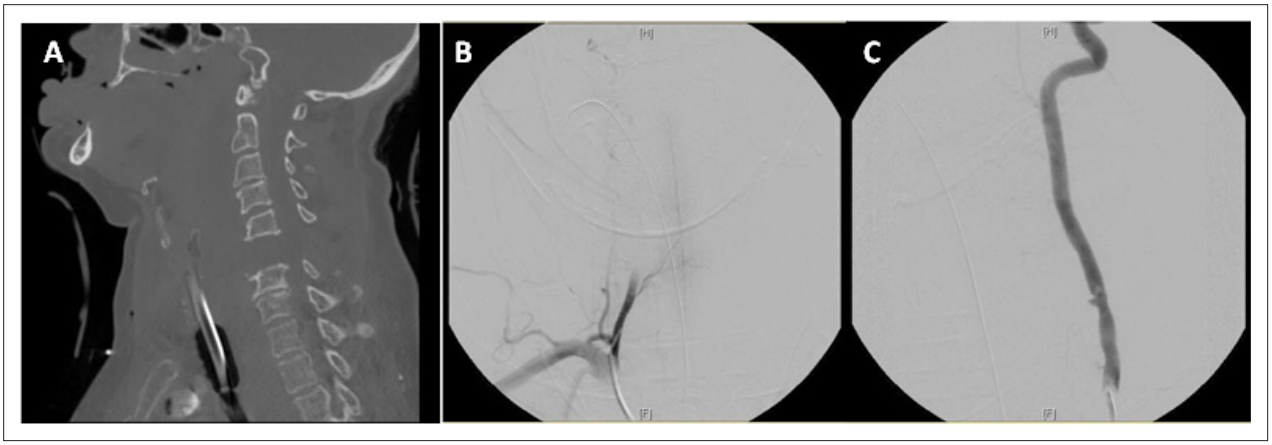

Figure 1. (A) Sagittal computed tomography scan demonstrating a vertical distraction injury of the C5-6 cervical spine. (B) Right vertebral angiogram demonstrating complete transection and (C) left vertebral angiogram demonstrating proximal focal dissection.

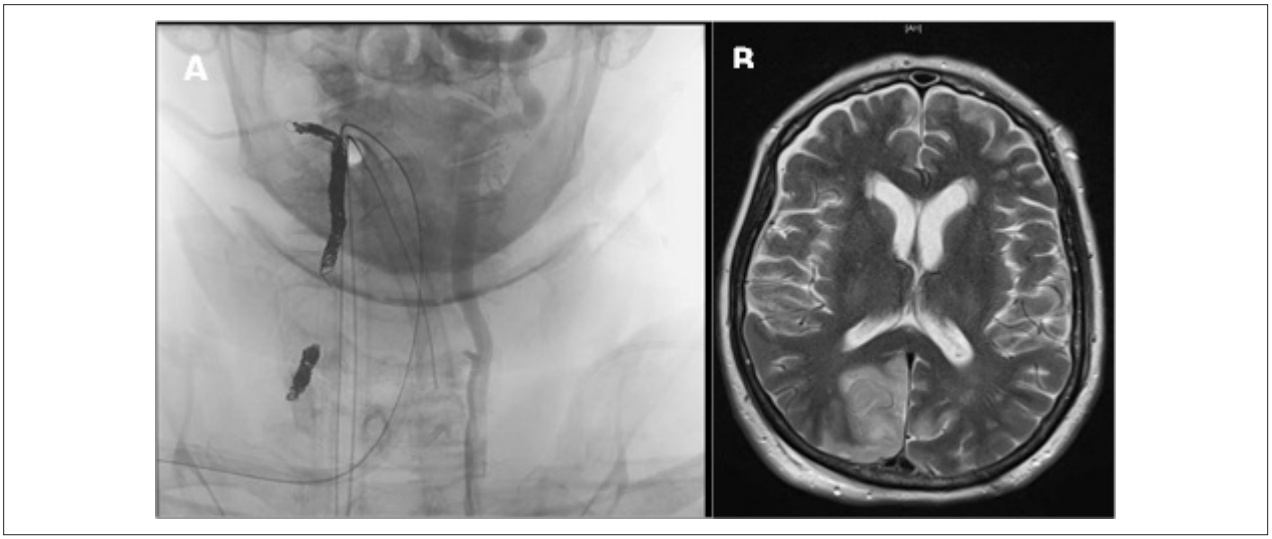

Figure 2. (A) Proximal and distal right vertebral artery coil embolization. (B) MRI demonstrating multiple infarcts.

right vertebral artery origin. The distal coil embolization was achieved in a retrograde fashion through the left vertebral and basilar artery to the level of C6, as seen in Figure 2.

She was taken directly from interventional radiology to the operating room with neurosurgery to undergo bilateral posterior lateral mass fixation from C4-6, laminectomy of C5 and C6, and posterior lateral arthrodesis at each level from C4 to T1. Her neurologic exam worsened on hospital day 7 with no movement in the right upper or lower extremity, but intact sensation to the distal thighs bilaterally. She underwent an MRI cervical spine and was noted to have bilateral cerebellar infarcts, which was further confirmed by an MRI brain.

By hospital day 15, she was able to flex her bilateral upper extremities with four-fifths strength and had one-fifth strength in her left lower extremity. She developed spastic quadriplegia with some purposeful movement of her right upper extremity. She was seen in consultation by physical medicine and rehabilitation, who managed her medically and with botulinum injections. She was discharged to a skilled nursing facility on hospital day 85.

Cervical spine injuries are very common in trauma populations and are often associated with blunt cerebrovascular injuries, especially involving the vertebral arteries, with up to 11% quoted in the literature.[3] These injuries are closely associated with subluxations and dislocations at the levels of C5-6, as seen in this patient. There have been few reports of vertical distraction injuries; one report described a distraction injury at C4-5, but the patient expired several hours after admission to the ICU.[2] Unilateral vertebral artery

injury rarely results in neurologic deficits due to multiple collateral vessels, but these injuries can still lead to vertebrobasilar insufficiency, ischemic stroke of the cerebellum or posterior circulation, or even death. Several other case reports have demonstrated a 100% mortality rate with vertebral artery transection.[4] The ideal management of a vertebral artery transection is described as endovascular treatment followed by surgical fixation of the cervical instability. In our patient, she had bilateral vertebral artery injuries, which can lead to death due to bilateral vertebral artery occlusion and ischemia of the brainstem. Although she did develop multifocal ischemic strokes, she maintained collateral flow to her brainstem to survive her initial trauma. One of the factors that may have contributed to her survival was her relatively minor intracranial injury and absence of solid organ injuries after the initial trauma; she was diagnosed with small bilateral subdural hemorrhages in the tentorial regions. Based on the small volume, neurosurgery and interventional radiology were able to initiate a fixed-rate heparin drip after her cerebral angiography and prevented further occlusion of her left vertebral artery. In conclusion, we challenge the current literature in stating that a vertebral artery transection has a 100% mortality rate, and we hope that this case may help serve as a possible treatment guide for other patients with vertebral artery transections.

Declaration of Conflicting Interests

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