Traumatic Vertebral Artery Transection Associated with Central Cervical Spinal Cord Injury without Bony Injury: A Case Report

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Cervical spine injury may be associated with vertebral artery injury (VAI). Cervical vertebral body or transverse foramen fracture, subluxation, or ligamentous injury at any level and any fracture at C1-3 have been reported to be risk factors for VAI. VAI caused by blunt trauma is mostly Biffi grade I-IV, and grade V (transection) is very rare¹⁰. We report a case of resuscitation after cardiopulmonary arrest caused by airway obstruction due to giant prevertebral hematoma from vertebral artery transection (VAT) associated with cervical spinal cord injury without bony injury.

An 85-year-old man with a medical history of hypertension, dyslipidemia, and brain infarctions requiring bilateral carotid artery stenting was sent to our institute after a fall down the stairs. On arrival at the hospital, his Glasgow Coma Scale (GCS) score was 8 (E2V1M5) with anisocoria. The SpO₂ level was 89% administering 15 L/min oxygen using a reservoir face mask and decreased to 70%. Oral tracheal intubation was unsuccessful due to circumferential swelling, distension of the neck, and airway obstruction. Difficulty ventilating with a bag-valve mask, low SpO₂, led to cardiac arrest. Return of spontaneous circulation was obtained after 1 cycle of cardiopulmonary resuscitation, and fiberoptic bronchoscope intubation was conducted. After the resuscitation, dual-phase arterial and venous enhanced computed tomography (CT) was performed. Although there was no fracture or dislocation of the cervical spine, a giant prevertebral hematoma (Fig. 1) and a transection of the right vertebral artery at the V2 segment (between the transverse foramen of C2 and C3) were found in the arterial phase, and coil embolization was performed (Fig. 2). No associated trauma was identified.

After admission, his GCS score improved to 11 (E4VTM6), and he complained of muscle weakness and dysesthesia in both upper limbs. His magnetic resonance imaging (MRI) demonstrated spinal cord compression with high intramedullary signal changes on the T2-weighted images at the C4/5 level. Prevertebral hematoma was markedly reduced (Fig. 3). Dynamic plain radiographs did not reveal any segmental instability. The diagnosis of central cervical spinal cord injury without bony injury was made. Posterior decompression surgery was performed on day 9 (Fig. 4), and his numbness in both upper limbs disappeared. He was transferred to the hospital for rehabilitation 1 month after surgery. At the 1-year postoperative follow-up, he was able to walk with assistance. His paralysis of the upper limbs continued but improved.

It is reported that 1/4 of cervical spine/spinal cord injuries is associated with VAI, 1/4 of them has cerebral ischemic symptoms, and 1/4 of them is fatal (the 1/4 rule)⁴. Therefore, early diagnosis and treatment of VAI is important. CT angiography is the gold standard for diagnosis of VAI⁵⁷. In this case, we could diagnose VAT early after resuscitation because we routinely perform dual-phase enhanced CT in trauma cases.

VAT by blunt trauma is very rare²³. Maloney et al. reported four cases of VAT. All cases were associated with cervical spine dislocation caused by high-energy trauma and expired⁷. To our knowledge, the only surviving case of VAT
CT scans on arrival demonstrated giant prevertebral hematoma (a) and a posterior spur at the C4/5 level (b). No fractures or dislocations were noted.

CT angiography demonstrated the right vertebral artery transection (a) with extravasation (b) at the V2 segment (between the transverse foramen of C2 and C3) (a). Bilateral carotid stents were placed (b). Transcatheter coil embolization was performed (c).

due to blunt trauma was the one reported by Yip et al. with fracture of the transverse foramen of C3-4 due to a fall. In our case, VAT occurred at the V2 segment where the artery is protected inside the transverse foramen. One potential etiology is arterial fragility due to underlying atherosclerosis estimated from medical history. Shearing or tearing forces can be transmitted to the VA between the transverse foramen of C2 and C3 following forced extension of the cervical spine, resulting in arterial transection.

Airway obstruction has been reported in patients with prevertebral hematoma from ankylosing cervical spine fractures or anterior longitudinal ligament injuries, but in this case, a giant prevertebral hematoma caused by a VAT resulted in airway obstruction and cardiac arrest. The patient was successfully managed with fiberoptic intubation, and the clinical course was uneventful.

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Figure 3. MRI demonstrated spinal cord compression with high intramedullary signal changes on the T2-weighted images at the C4/5 level. Prevertebral hematoma was markedly reduced (a: sagittal plane, b: axial plane).

Figure 4. Postoperative CT. C3 laminectomy and C4–6 laminoplasty were performed (a). Postoperative MRI demonstrated adequate spinal cord decompression (b).

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Ethical Approval: None. (As this is a case report without identifiers.)

Informed Consent: The patient was informed that data from the case would be submitted for publication and gave his written consent.

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