H12 Computed Tomography (CT) and X-Ray Angiography on a Case of Traumatic Carotid Artery Occlusion Following a Physical Altercation Resulting in Cerebral Infarction

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Learning Overview: The goal of this presentation is to serve to heighten the awareness of the setting in which carotid artery lesions could potentially be missed on autopsy. Application of postmortem CT or X-ray angiography can aid in the identification and evaluation of these lesions.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by raising awareness regarding the appropriate process involved in the evaluation of carotid artery trauma and thrombosis due to blunt force injury.

There is a paucity published in the medical forensic literature on cases related to carotid arterial injury. Furthermore, there is a risk that such a finding may be overlooked during postmortem examination, especially in the presence of multiple blunt force injuries, with misinterpretation of findings leading to incorrect cause and manner of death certification. CT and X-ray angiography can aid in the identification of such an injury. This presentation describes such a case, which provoked a brief review of related available literature.

The decedent was a 33-year-old man with no significant medical history who was involved in a physical altercation with another individual and subsequently complained of feeling unwell. Three days later he was found unresponsive at his residence; emergency medical services responded and transported him to a local hospital where he was diagnosed with a large left-sided stroke. An ultrasound revealed carotid artery occlusion. Despite medical interventions, he was pronounced deceased after brain death was confirmed, and after the family elected to remove life support.

At autopsy, the external examination revealed a healing abrasion on the left posterolateral upper neck, and multiple healing abrasions on the chest, back, and extremities. CT and X-ray angiography of the head and neck were performed and showed occlusion of the left internal carotid artery. Internal examination revealed superficial hemorrhage of the left sternocleidomastoid muscle and patchy soft tissue hemorrhage posterior to the left internal carotid artery, the lumen of which showed an occluding thrombus just distal to the bifurcation of the left common carotid artery. There was no histologic evidence of medial dissection. The thrombus extended to involve the left middle cerebral artery with associated cerebral infarction involving the left cerebral hemisphere. The left cerebral hemisphere showed marked edema. Left cingulate herniation and left uncal herniation were apparent, as well as bilateral tonsillar herniation of the cerebellum. The remainder of the autopsy was essentially unremarkable. The toxicology screen was negative for drugs of abuse. The cause of death of this decedent was certified as acute cerebral infarction due to traumatic carotid artery occlusion following a physical altercation. The manner of death was certified as a homicide due to the temporal relationship between the physical altercation and the development of symptoms.

Singh and associates have reported occlusion involving the internal carotid artery and, in a separate case, occlusion involving the common carotid artery.[1] Both cases had presentations that could have led to misinterpretation of medical findings, leading to missed diagnoses of carotid artery injury and occlusion due to trauma. According to Liu et al., blunt carotid artery injury leading to thrombosis and neurologic impairment has an incidence rate of 1%.[2] Biomechanically, they reported such injuries can occur either via direct blunt force injury, hyperflexion of the cervical spine resulting in arterial compression involving the mandible and spine, oropharyngeal trauma, hyperextension of the cervical spine and rotation, and the fracture of the basal skull causing injury of the intracranial segment of the internal carotid artery. In the forensic literature, An reported that fatal thrombosis involving the internal and common carotid arteries can occur in the setting of little-to-no evidence of external or internal injury, as was seen in the presented case.[3]

Reference(s):

1. Singh A.K., Okudera H., and Kobayashi S. Traumatic carotid artery occlusion following blunt cervical injury. *J Clin Neurosci*. 1999 May; 6(3): 265-268.
2. Liu W.P., Ng K.C., and Hung J.J. Carotid artery injury with cerebral infarction following head and neck blunt trauma: Report of a case. *Yale J Biol Med.* 2005 May; 78(3): 151-156.
3. An T.L. Fatal thrombosis of internal carotid artery following minor blunt trauma to the neck. *J Forensic Sci.* 1989 May; 34(3): 699-702.

Blunt Force Neck Injury, Carotid Artery Thrombosis, Traumatic Vascular Injury

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