H4 Strangulation to Stroke: A Fatal Case of Delayed Traumatic Internal Carotid Artery Dissection

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Learning Overview: After attending this presentation, attendees will be aware that carotid artery dissection is an uncommon, delayed presentation of strangulation.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by increasing awareness of an uncommon mechanism of death occurring as a result of neck manipulation and/or trauma. This case stresses the importance of obtaining a thorough history for previous trauma in cases of carotid artery dissection and stroke to properly certify these deaths.

Traumatic carotid artery dissections are uncommon and can be fatal injuries with a delayed onset. The time between neck trauma and neurological signs can be hours to years following the initial injury.

A 32-year-old female presented to the emergency room after being sexually and physically assaulted and strangled. Upon physical examination, she had multiple contusions and lacerations, subconjunctival hemorrhage bilaterally, and a faint ligature mark predominantly around the right side of her neck. A Computed Tomography (CT) of the brain was normal. She was awake and alert. The woman was interviewed by police. Approximately four hours later, she developed an acute left hemiparesis and aphasia. A repeat CT scan of the head showed an infarct in the right middle cerebral artery territory. A Computed Tomography Angiography (CTA) demonstrated a complex dissection of the right internal carotid artery with thrombus extending into the middle cerebral artery. Despite multiple attempts at mechanical thrombectomy and neurosurgical intervention, she was declared brain dead and expired four days later. An autopsy confirmed the cause of death as cerebral infarction due to right internal carotid artery dissection due to ligature strangulation, and the manner was certified as homicide.

Carotid artery dissection is rare but is the most common cause of stroke in people under 45 years of age. It can occur spontaneously or secondary to trauma. Spontaneous dissections are often associated with connective tissue disorders, such as fibromuscular dysplasia. The majority of traumatic carotid artery dissections are due to high-speed motor vehicle accidents, sports, falls, and violent activity. The mechanism by which traumatic carotid artery dissection occurs is hypothesized to be due to stretching of the artery during neck hyperextension, compression against the spinal column during contralateral flexion of the neck, and direct blunt trauma from a blow or other external force. When the dissection occurs, a thrombus may form nearby and result in distal embolism or occlusion.

Cerebral infarction following dissection can be immediate or significantly delayed with respect to the decedent's initial presentation. The interval from neck trauma to onset of neurological symptoms is generally considered to be within 24 hours. However, multiple reports in the literature describe intervals of months and, rarely, even years. Despite medical treatment, including anticoagulation therapy, resulting in a high percentage of spontaneous resolution, a subset of dissections may progress to a chronic stenosis, complete occlusion, or a pseudoaneurysm with risk of rupture. Thus, the association of arterial pathology with the inciting event may be lost due to the delay in presentation.

This case highlights the danger of delayed stroke as a consequence of strangulation, a phenomenon rarely described in the forensic literature. Acquisition of a complete history regarding previous trauma, especially neck pressure or manipulation, is necessary information required for proper certification of deaths related to carotid artery dissection and/or ischemic stroke.

Strangulation, Carotid Artery Dissection, Stroke