



G59 Intracranial Internal Carotid Laceration at the Site of an Atherosclerotic Plaque: A Case Report

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The goals of this paper are to present to the forensic community an unusual injury and an analysis of its mechanism with respect to both trauma and natural disease.

This is a case of a 35-year-old man who received a blow to the face that abruptly and forcefully hyperextended and rotated his head to the left. Autopsy revealed an intracranial right internal carotid artery laceration extending from a calcified atherosclerotic plaque, with an

associated basilar subarachnoid hematoma. This injury is unusual both because of its intracranial location and because of the presence of the atherosclerotic plaque.

Hyperextension of the head can cause injury to the vessels at the base of the brain. Generally, the extracranial portions of the vessels are affected, and laceration is believed to be caused by the sudden stretching of these vessels due to the abrupt movement of the head. In this case, the intracranial internal carotid is affected, which can be partially explained both by the rotational acceleration of the brain within the cranium as the head moves in response to the blow, and the abrupt increase in intravascular pressure caused by vessel stretching. During hyperextension or rotation of the head, the brain oscillates in the cranium due to its inertia, and this oscillation is opposite to the movement of the head, exposing tethered vessels within the head to shear forces. The quick and exaggerated movement of the head also stretches vessels, particularly those present in the neck, causing an abrupt increase in intravascular pressure that is transmitted to the intracranial portions of the vessels.

The atherosclerotic plaque found at the site of the laceration may also have contributed to the injury. Atherosclerosis has been documented to alter the structural integrity of vessel walls by destroying and altering tissue. Additionally, atherosclerosis changes the elastic property of arterial vessels and therefore lessens their ability to respond to abrupt or large changes in pressure load, with the response being more impaired the greater the pressures applied. Synergistically, the effects of atherosclerosis may have made the intracranial carotid more vulnerable to trauma than a healthy, non-atherosclerotic vessel might have been.

In order to delineate the roles of trauma and natural disease in the formation of this unusual lesion, photographs of the case are shown, and several published references on both traumatic injury to the head and neck vessels and atherosclerosis are reviewed and cited.

Hyperextension, Atherosclerosis, Subarachnoid Hemorrhage