



### H75 Subdural Hematoma, Retinal Hemorrhages, and Cerebral Venous Sinus Thrombosis (CVST): Homicidal or Natural Death

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The goals of this presentation are to: (1) identify the spectrum of cerebral changes secondary to CVST; (2) discuss the relationship between subdural hematoma and CVST; (3) discuss the relationship between retinal hemorrhage and CVST; and, (4) better interpret the manner of death in patients presenting with subdural hematoma and CVST.

This presentation will impact the forensic science community by advising attendees that the relationship between sinus thrombosis and subdural hematoma is of critical importance in assessing the manner of death in young children. This case, in addition to the literature review, provides valuable insight into this controversial issue.

**Background:** In the setting of witnessed, severe traumatic brain injury with subdural hematoma, CVST is not a meaningful differential diagnostic consideration; however, in the pediatric setting, severe traumatic brain injury within the home may be unwitnessed, especially among infants and toddlers. In such cases, the caretaker may not provide an accurate account of the extent, severity, or mechanism of trauma. Moreover, victims of inflicted head trauma often suffer neurological collapse with increased intracranial pressure, resulting in non-perfusion and organizing coagula within venous sinuses, mimicking CVST. The question may then be raised as to whether CVST was a primary process or an event secondary to abusive head trauma.

**Methods:** This study presents the autopsy findings in a 2-month, 21-day-old male infant who initially presented to hospital with seizures. The infant's father indicated that the infant fell during a diaper change but did not cry or respond. Subsequently, the father placed the child on the living room couch for a nap and within minutes he noted that the infant changed positions with his face toward the back of the couch. The father and paternal grandmother then noticed a diminished level of responsiveness. The father "shook" the infant briefly in an attempt to arouse him. Neither the father nor paternal grandmother report the infant hitting anything while being shaken. A Computed Tomography (CT) scan on presentation demonstrated acute subdural hemorrhage along the high right frontoparietal convexity near the vertex and along the interhemispheric fissure posteriorly with a maximum 3mm thickness. Magnetic Resonance Imaging (MRI) with and without contrast demonstrated restricted diffusion consistent with ischemia, within the right cerebrum and most of the left cerebrum. No venous sinus thrombosis was noted in the initial MRI. Ophthalmological evaluation revealed extensive intraretinal hemorrhages. The infant's neurological status failed to improve and he was eventually placed in hospice care. He expired approximated five weeks after presentation.

**Results:** Autopsy examination demonstrated bilateral extracerebral fluid collections with neomembranes. The underlying parenchymal tissue showed extensive ischemic brain injury. Ophthalmic pathology examination was remarkable for intraretinal, multilayered hemosiderin deposits and hemosiderin deposits involving the optic nerve sheaths. Noteworthy was organizing CVST with neovascularization and calcification, involving the superior sagittal sinus, transverse sinuses, and torcula.

**Conclusion:** This case raises the issue of CVST as a potential mimic for abusive head trauma. Literature review reveals that CVST as a cause of subdural hematoma is rare, but not non-existent. Although the MRI findings did not reveal evidence of CVST at presentation, the presence of unequivocal organizing CVST, the paucity of such lesions in longer term survival of abusive head trauma, and the lack of evidence for brain swelling and increased intracranial pressure clinically, suggested that CVST as the primary process could not be excluded. Abusive head trauma with subsequent cerebral venous stasis was also not excluded.

#### Cerebral Venous Sinus Thrombosis, Subdural Hematoma, Retinal Hemorrhage