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### H24 Severe Retinal Hemorrhages With Retinoschisis Are Not Pathognomonic for Abusive Head Trauma

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After attending this presentation, attendees will learn that severe retinal hemorrhages with retinoschisis can occur in infants and toddlers following head injury from short falls and from spontaneous intracranial hemorrhage due to ruptured, dural-based vascular malformations.

This presentation will impact the forensic science community by increasing the attendees' awareness of the natural and traumatic conditions associated with severe retinal hemorrhages and retinoschisis in infants and toddlers.

The combination of subdural hemorrhage, retinal hemorrhage, and encephalopathy, or the presence of severe retinal hemorrhages, alone in infants is often stated to be pathognomonic for abusive head trauma; however, the same constellation of findings has been identified in accidental head injuries and natural diseases. Presented here are two cases of severe retinal hemorrhages with retinoschisis associated with subdural hemorrhage from a ruptured vascular malformation and with severe cerebral edema in an accidental head injury.

**Case Report 1:** A 3½-month-old infant suddenly began making choking noises, arched his back, stiffened, and then became lethargic. He was driven to a hospital where he was found to be lethargic (GCS 9), and had flat fontanelles and equal, round, and reactive pupils. A Computed Tomography (CT) scan of his head revealed "a large left-sided interhemispheric subdural hematoma" that extended over the left frontoparietal convexity and caused approximately 4mm of midline shift. He was transported to a tertiary hospital with a Pediatric Intensive Care Unit (PICU). His condition deteriorated and a repeat CT scan revealed worsening of the hemorrhage and mass effect. He underwent an emergency craniectomy and hematoma evacuation. An ophthalmology examination two days later revealed pre-retinal hemorrhage with areas of schisis in the right eye and possible vitreous hemorrhage in the left eye. The findings were said to be "consistent with non-accidental trauma." He expired the evening of the fourth hospital day. The clinical diagnosis was non-accidental head injury.

The autopsy revealed a well-developed, anasarctous, infant male who was status post left frontal-temporal-parietal craniectomy and had a large, predominantly left-sided subdural hemorrhage, extensive intradural hemorrhage of the falx cerebri, subarachnoid hemorrhage, right frontal and occipital lobe infarcts, cerebral edema, bilateral optic nerve sheath hemorrhages, and extensive bilateral retinal hemorrhages and retinoschisis. A vascular malformation of the falx cerebri was identified and confirmed with immunohistochemistry for CD31 and CD34. The cause of death was a ruptured vascular malformation of the falx cerebri and the manner of death was natural.

**Case Report 2:** A 14-month-old toddler was on a train ride in a mall when he stood on the seat, fell, and struck his head on the ground. He was unresponsive, bleeding from his head, bradycardic, and his pupils were non-reactive. He was intubated and airlifted to a hospital. A CT scan of his head revealed diffuse cerebral edema, loss of the gray/white matter interface, diffuse subarachnoid hemorrhage, and a left occipital fracture. He progressed to brain death approximately one week later.

The autopsy revealed an abrasion of his face, scalp and subgaleal hemorrhage, a left occipital skull fracture, diffuse subarachnoid hemorrhage, cerebral edema, necrosis of the cervical spinal cord, subdural hemorrhage of the spinal cord, and bilateral optic nerve sheath and retinal hemorrhages with a circinate retinal fold in the left eye. The cause of death was blunt head injury and the manner of death was accident.

The presence of severe retinal hemorrhages with retinoschisis in young children is often said to be pathognomonic of abusive head trauma and this was the clinical diagnosis in Case 1. The interhemispheric location of the large subdural hemorrhage in Case 1 and the extensive hemorrhage in the falx cerebri found at autopsy are not typical of trauma, and a vascular malformation in the falx cerebri was identified as the cause of the bleeding. This child had severe, bilateral retinal hemorrhages with bilateral retinoschisis and had a clinical diagnosis of abusive head trauma. Case 2 was a clearly documented and witnessed accidental fall, which resulted in an occipital skull fracture, diffuse subarachnoid hemorrhage, cerebral edema, and bilateral retinal hemorrhages with left retinoschisis. These cases illustrate that the presence of severe retinal hemorrhages with retinoschisis are not pathognomonic for abusive head trauma.

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#### Retinal Hemorrhage, Retinoschisis, Abusive Head Trauma