G104 Postmortem Detection and Evaluation of Retinal Hemorrhages

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After attending this presentation, attendees will gain a better understanding of the variety of disease processes associated with retinal hemorrhages in neonates, infants, children, and adults.

This presentation will impact the forensic community and/or humanity by demonstrating how postmortem monocular indirect ophthalmoscopy permits visualization of the fundus after death and can identify retinal hemorrhages associated with a variety of conditions in children and adults.

Although occurring in about 25% of adults with subarachnoid hemorrhage, Terson syndrome has been considered rare in children and any retinal hemorrhages (RHs) not associated with inflicted childhood neurotrauma have been described as few in number and restricted to the posterior pole. A number of ophthalmologists, pediatricians, and forensic pathologists have asserted that RHs in conjunction with intracranial hemorrhages in children can be considered virtually pathognomonic for inflicted childhood neurotrauma or shaken baby syndrome based on the number, character, location, and distribution of RHs. Unfortunately but characteristically, most studies to date concerning hemorrhagic retinopathy in non-accidental head injury have lacked specific criteria for case definition, exhibited observational and selection bias or cases were selected by the presence or absence of RHs - the clinical or autopsy finding that was being sought as diagnostically valid.

Since June of 2004 the authors have used postmortem monocular indirect ophthalmoscopy to prospectively examine the eyes of 425 deceased individuals at the institution (medical examiner and non-medical examiner cases) ranging in age from birth to 96 years. The postmortem interval ranged from 1 hour to 3 days with 65.9% of examinations occurring less than 24 hours after death. Slightly over 17% exhibited retinal hemorrhages associated with a variety of diseases and conditions. The number of decedents with retinal hemorrhages by age group is listed in the accompanying Table.

Age Range of Decedents and Presence/Absence of Retinal Hemorrhages

	< 1 yr	1-4 yrs	5-9 yrs	10-14 yrs	> 15 yrs	Total
Cases in which fundi not visualized	6	0	2	1	5	14
Cases with no RHs	43	14	7	4	270	338
Cases with RHs	11	3	3	2	54	73
Total	60	17	12	7	329	425

Conditions or causes of death associated with the presence of RHs by age group and number of cases (noted in parenthesis) were:

< 1 yr: Birth-related (2), asphyxia/suffocation (2), Sudden Infant Death Syndrome (SIDS)/resuscitation (2), apnea/gastroesophageal reflux (1), inutero intracranial hemorrhage (1), blunt trauma of head (1), prematurity/congenital heart disease (1), meningitis (1)

1-4 yrs: Blunt trauma of head (3)

5-9 yrs: Blunt trauma of head (3)

10-14 yrs: Intra-cranial hemorrhage/metastatic cancer (1), blunt trauma of head (1)

> 15 yrs: Blunt trauma of head (17), coagulopathy (10), gunshot wound of head (7), ruptured saccular aneurysm (7), intra-cerebral hemorrhage/hypertension (6), subarachnoid hemorrhage/vascular malformation (1), hypoxicischemic brain injury/drug toxicity (1), meningo-encephalitis/leukemia (1), intra-cerebral hemorrhage/amyloid angiopathy (1), hypertension (1), diabetes mellitus (1), pulmonary fibrosis/extra-corporeal membrane oxygenation (1).

The manner of death in children under the age of 14 years with RHs (by age group and number of cases) was:

< 1 yr: Natural (7), Accident (2), Homicide (1), Undetermined (1)

1-4 yrs: Homicide (2), Accident (1)

5-9 yrs: Accident (3)

10-14 yrs: Natural (1), Homicide (1)

Histological ocular examination of 28 neonates, infants, children and adults with retinal hemorrhages from this study demonstrated a variable pattern as to the number, character, location and distribution of retinal and optic nerve sheath hemorrhages. Of the 73 individuals with retinal hemorrhages, 75.3% died in the hospital;

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however, only four children and one adult had documented clinical fundal examinations. The four children had child abuse consults while the adult experienced a vitreous hemorrhage from thrombocytopenia during treatment for leukemia. Postmortem monocular indirect ophthalmoscopy is a valuable technique for identifying retinal hemorrhages associated with a variety of conditions and diseases in children and adults.

Retinal Hemorrhages, Postmortem Monocular Indirect Ophthalmoscopy, Shaken Baby Syndrome

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