G31 Neuropathology of Pre-Teen Homicides in the State of Maryland: 1994-2004

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After attending this presentation, attendees will appreciate that preteen homicides differ from that of other age groups. Brain pathology is a common finding in childhood homicide, especially in cases with a blunt force component. The majority of pre-teen homicides are due to blunt force injuries of the head or head and torso. Detailed, systematic study and documentation of the central nervous system and ophthalmic injuries is essential in determining the nature and timing of the injuries and ruling out natural diseases or accidental injuries.

This presentation will impact the forensic community and/or humanity by demonstrating; (1) a better understanding of the epidemiology of pre-teen homicides; (2) the necessary role of neuropathologic studies in childhood homicides; and (3) an understanding of the pattern of injuries in blunt force head trauma in children

Background: The State of Maryland (population below 6 million, half rural) has a unified medical examiner system that investigates suspicious deaths following standard protocols. Homicides in pre-teens differ from those in the general population in victim's characteristics (e.g. gender distribution), causes of death (e.g. firearm use), environment of death (e.g. home) and patterns of injuries.

Method: Cases were reviewed and tabulated for demographic characteristics, cause of death, post-injury survival, systemic and brain injuries. Cases with a significant central nervous system component were examined by a single neuropathology's (JCT). The majority of the cases included examination of the spinal cord and eyes. Cases were stored in a centralized database. Data was retrieved and analyzed by nonparametric statistical methods.

Results: From 1994 to 2005 one hundred and eighty five children younger than 13 years of age suffered homicidal deaths in the State of Maryland (7.5 % of all deaths reported to the office for that age group). Blunt force injuries were the most common cause of death (95 cases, 51.1%) followed by firearms (16.7%) and asphyxia (16.2%), each preferentially affecting children of specific ages. Most children with blunt force injuries had significant neuropathology, and this is the focus of the following study.

There was overrepresentation of cases in the Baltimore metro area (60% of the cases; 12% of the State wide population). Girls were slightly more prevalent than boys (52 vs. 48%) and African-Americans represented 64.5% of the total. Median age was 1.1 years. Brain weight ratio (brain weight obtained at autopsy divided by standard brain weight for individual's age) was 1.1. The neuropathologic findings depended on age, survival after injury and mechanism of force. The majority of the cases had external (73.7%) signs of blunt force head injuries, either alone (50%) or in combination with torso injuries (50%), with an average of 4.7 (median 4) head contusions/abrasions identified at autopsy. Injuries included intracranial subarachnoid hemorrhage (61.5%), intracranial subdural hemorrhage (55%), hypoxic injuries (35%), cortical contusions (38.5%), brain swelling (21%), intracranial epidural hemorrhage (17%), and gliding (intermediate) contusions (15.4%). White matter tears and diffuse axonal injuries were rare. Spinal cord was obtained and studied in 70 of 95 cases (73.7%). Intraspinal hemorrhage was seen in 31% (subarachnoid 24.3%, subdural 23% and epidural 17%). Eye pathology was found in 44 of 60 cases studied (73%), and was bilateral in 95% of them.

Summary and conclusions: Brain pathology is a common finding in childhood homicide, especially in cases with a blunt force component. The majority of pre-teen homicides are due to blunt force injuries of the head or head and torso. Age, gender, and race influence specific neuropathologic findings. Brain weight ratio correlates with survival and is influenced by neuropathology. Detailed, systematic study and documentation of the central nervous system and ophthalmic injuries is essential in determining the nature and timing of the injuries and ruling out natural diseases or accidental injuries.

Blunt Force Head Injuries, Pre-Teen Children, Homicides

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