G38 Evaluation of Head Trauma With Antemortem Radiology and Postmortem Pathological Data

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The goal of this presentation is to show how antemortem imaging data including conventional radiography and Computed Tomography (CT) were compared to the postmortem pathological data that served as the gold standard with regard to common forensic neurotrauma findings such as skull fractures, soft tissue lesions of the scalp, various forms of intracranial hemorrhage, contusion, axonal injury, signs of increased brain pressure or herniation, edema and ischemia. In this study, the purpose is to establish if any difference between radiological and autopsy data occurred in the short period of time after trauma and if conventional radiography and CT is beneficial for forensic head and brain examination.

This presentation will impact the forensic science community by showing how cases underline the importance of a detailed investigation and a thorough evaluation of all circumstantial, clinical, radiological, and autopsy data in the reconstruction of forensic fatalities to identify any possible legal responsibilities of anyone.

Introduction: Head trauma is one of the leading causes of traumatic deaths. The radiological reconstruction of trauma before the autopsy will guide exploring the circumstances of many forensic deaths including occupational, accidental, and medical malpractice cases, especially in the case of hospitalization for a long period of time. The increasing applications of forensic radiology and the wide use of conventional radiography and CT in clinical practice also demonstrate the potential of these technologies as tools for verifying the correspondence between an unidentified body and an identity suspect. CT is the imaging modality of choice for 2D and 3D documentation and analysis of postmortem findings including fracture systems, pathologic gas collections (e.g., air embolism, subcutaneous emphysema after trauma, hyperbaric trauma, decomposition effects), and gross tissue injury. Various post-processing techniques can provide strong forensic evidence for use in legal proceedings. Besides, Magnetic Resonance (MR) imaging has also had a greater impact in demonstrating soft-tissue injury, organ trauma, and nontraumatic conditions.

Methods: The antemortem imaging data, including conventional radiography and CT, were compared to the postmortem pathological data that served as the gold standard with regard to common forensic neurotrauma findings such as skull fractures, soft tissue lesions of the scalp, various forms of intracranial hemorrhage, contusion, axonal injury, signs of increased brain pressure or herniation, edema, and ischemia

Findings: Reports of both postmortem pathological and the antemortem radiological examination of brain and skull in 31 head trauma cases were evaluated. Age range was between 1 to 90. Gender included 25 male and 6 female cases. Any distinct difference between the antemortem imaging and the autopsy data was not found in the case of skull fracture and various forms of intracranial hemorrhage. Axonal injury and contusions were detected more sensitively with the autopsy than with the imaging techniques. During the time the autopsy and radiology reports were performed other brain lesion findings were discussed.

Conclusion: The cases underline the importance of a detailed investigation and of a thorough evaluation of all circumstantial, clinical, radiological, and autopsy data in the reconstruction of forensic fatalities to identify any possible legal responsibilities of anyone. The documentation and analysis of antemortem findings with CT and MR imaging is investigator independent, objective, and noninvasive and will lead to qualitative improvements in forensic pathologic investigation. In addition, as with other morphological methods for identification, comparisons between antemortem and postmortem data require standardization and statistical analysis, especially concerning the admission in court of evidence obtained by anthropological and radiological methods. In consideration of these facts, radiological techniques have the power to play an important role in the forensic pathological examination.

Head trauma, Radiology, Autopsy

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