



G19 Contributions From Forensic Imaging to the Investigation of Fatal Upper Cervical Fractures

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After attending this presentation, attendees will understand the value of advanced diagnostic imaging procedures in forensic medical investigations of upper cervical spine fractures following trauma.

This presentation will impact the forensic community by showing how upper cervical spine fractures are frequently seen in relation to fatal trauma to the head and neck, and where this anatomical region may be difficult to evaluate during medicolegal autopsy, the contributions from advanced diagnostic imaging procedures may be of great importance to the investigation.

The purpose of this presentation is to present the value of advanced diagnostic imaging procedures in the forensic medical investigations of upper cervical spine fractures following trauma.

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The upper cervical spine is clinically a very important anatomical region, where the high degree of mobility is obtained on the expense of poor stability. Several types of fractures are possible at the atlas (C1) and axis (C2) vertebrae. Five cases have been retrieved where different types of trauma, (e.g., road traffic crash collisions, fall, blow to the head from moving objects), had occurred causing fractures to the upper cervical vertebrae. Each of the deceased was examined using advanced computed tomography, an in-house Siemens Definition 64 slice dual-energy scanner facility, as adjunct to the medicolegal autopsy. The upper cervical spine was reconstructed using sub-millimeter slice thicknesses and all images were examined in three planes (horizontal, coronal, and axial) as well as using 3-dimensional reconstructions. The findings from the CT-scanning were correlated with the findings from the medicolegal autopsy and the contributions from the forensic imaging procedures to the medicolegal investigations were evaluated.

The review of five unique cases with upper cervical spine fractures showed that forensic imaging procedures in combination with medicolegal autopsy allow very detailed evaluation and categorization of fractures. Although fractures of the odontoid process were readily identified during autopsy, the exact classification according to the system by Anderson and D'Alonzo was made possible by examination of the CT-images. The fractures of the atlas were more difficult to visualize during the medicolegal autopsy, particularly at the posterior arch, whereas the diagnostic imaging procedures allowed clear identification as well as classification of the fractures according to the system proposed by Jefferson.

This presentation of five trauma cases showed that advanced diagnostic imaging procedures contributes significantly to the forensic medical investigations of upper cervical spine fractures following trauma. This is important as implementation of such adjunct procedures to the medicolegal autopsy may strengthen the degree of detail of the investigation. Although this is a small group of selected trauma cases, this presentation highlights some of the major advantages achieved by expanding the forensic investigations to also include forensic imaging procedures.

A number of cases that have in common the presence of upper cervical spine fractures will be discussed. The contributions to the medicolegal investigations from advanced computed-tomography scanning will be presented and it is recommended that forensic specialists become familiar with the potential of advanced imaging procedures to the medicolegal investigations.

Cervical Fracture, Forensic Imaging, Postmortem Autopsy