H132 Forensic Radiology Pitfalls

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The goals of this presentation are to: (1) educate attendees as to basic Computed Tomography (CT) radiology principles; and, (2) highlight important imaging artifacts using three case studies of firearm injuries to the head. After attending this presentation, attendees will better understand CT radiology used in a forensic setting and some of the pitfalls associated with the interpretation of antemortem and postmortem acquisition of images.

This presentation will impact the forensic science community by discussing differences that may occur between images obtained during life versus those obtained in the postmortem interval using three examples of firearm injuries of the head. As the field of radiology is an entire discipline unto itself, this presentation will merely highlight some of the fundamental principles of radiology (especially CT radiology) as they apply to forensic investigation.

CT imaging is becoming more attractive as a supplemental tool for autopsy to coroner's/medical examiner's offices of all sizes throughout the country; therefore, forensic pathologists are increasingly interpreting CT images obtained prior to the decedent's death or, in fewer offices, obtained after death to guide the autopsy. This trend will only increase as clinician's reliance on CT imaging surpasses the use of conventional X-rays. Though forensic radiology is becoming an established field of study, most forensic pathologists do not have the volume of imaging or resources necessary to support the use of a full-time forensic radiologist. Many municipalities are therefore expected to perform these radiologic examinations and interpretations on their own. This growing practice can prove difficult as most forensic pathologists have only a basic knowledge of CT radiology and basic understanding of artifactual findings. Difficulties can emerge when antemortem CT images are available but without the reported interpretation, especially when artifacts commonly known to radiologists but not to forensic pathologists are present. Three examples of short-term survivors who had firearm injuries of the head and who underwent antemortem CT imaging are discussed. Review of copies of the antemortem CT images of the heads that were available to the forensic pathologist prior to the start of the autopsies showed radiodense objects suggestive of pellets from a shotgun, which was not consistent with the gross appearance of the injuries. The apparent discrepancies were resolved based on comparisons with the conventional X-rays and an understanding of the basic differences in antemortem and postmortem acquisition of CT images.

To explain these differences, a brief overview of CT radiologic theory will be presented with a discussion of how CT images are obtained as well as a basic overview of computer-aided reconstruction techniques. The manipulation of CT images using window and level adjustment to clarify images and decrease artifacts will also be highlighted.

Computed Tomography, Artifact, Forensic Investigation