



Pathology & Biology Section – 2008

G98 Preliminary Study and Potential Role of CT Imaging Autopsy in the Investigation of Death Due to Accidental Blunt Trauma

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The goals of this presentation are: (1) to understand the investigational technique of 2 dimensional and 3 dimensional CT imaging autopsy in the medical examiners investigation of death, (2) to review a U.S. medical examiners office early experience and results of CT imaging autopsy compared with conventional autopsy for fatal accidental blunt trauma, and (2) to describe circumstances where CT imaging autopsy may evolve into a triage tool for the medical examiners investigation of sudden death.

This presentation will impact the forensic community and humanity by addressing the potential role of non-invasive CT imaging autopsy to replace conventional autopsy or enable performance of limited, focused autopsy in the U.S. medical examiners investigation of fatal accidental blunt trauma. CT imaging autopsy has potential for rapid and cost effective investigation in such circumstances, including mass casualty investigations. It may also provide options in the setting of religious and cultural objections to conventional autopsy.

Recent publications have suggested a potential role for high-resolution CT imaging using 2D and 3D techniques in the forensic investigation of death. This pilot study evaluated the sensitivity of CT imaging autopsy for major injuries and accuracy for the cause of death. The study also evaluated the potential role of CT imaging autopsy as a replacement for or adjunct to conventional autopsy in the investigation of traumatic accidental death within a U.S. state medical examiner system.

Of 40 decedents prospectively investigated with whole body 40- detector row 2D and 3D CT within 24 hours of death, 27 were identified as victims of suspected accidental blunt trauma. Each CT study acquired approximately 3,000 images in 10 minutes scanning time and required 30 minutes interpretation time. As this was a new technique, CT was interpreted with consensus reading by 2 radiologists and compared with medical examiners autopsy results for major findings and cause of death in all cases.

CT imaging autopsy correctly identified 217 major traumatic findings (average 8/decedent, sensitivity 93.4%). It correctly identified a specific injury or combination of blunt trauma injuries as the cause of death in 25 cases and excluded traumatic death in 2 others. Fourteen major false-negative CT findings included non-displaced atlanto-occipital subluxation (n=4); fractures of the ribs or sternum (n=3); lacerations of the aorta (n=3), bronchus (n=1), and liver (n=1); cardiac contusion (n=1); avulsion of the renal pedicle (n=1). CT identified 8 major findings not detected at conventional autopsy: fractures of sacrum (n=2), mandible (n=2), skull base (n=2), cervical spine (n=1); lung lacerations (n=1). Suspected significant air embolism associated with major skull base or thoracic trauma (n=6) and tension pneumothorax (n=1) were noted on CT but not found at autopsy, likely related to the technique used.

This early experience suggests that CT imaging autopsy has promise as a sensitive tool for the detection of major injuries and accurately determines the cause of death after accidental blunt trauma. It may be insensitive for some major findings including non-displaced fracture or subluxation and the exact site of vascular injury in the setting of obvious major hemorrhage. Air embolism appears to be more easily detected by CT than conventional autopsy and may play a greater role in death due to blunt trauma than previously recognized.

CT Imaging, Autopsy, Accidental Blunt Trauma