



# Jurisprudence Section - 2015

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## F20 Trust — But Verify: The Reliability of Radiograph Techniques in the Courtroom

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After attending this presentation, attendees will understand some of the limitations of conventional radiographic techniques and the need for confirmation by another radiographic technique and/or pathological examination and interpretation by trained experts in the field.

The presentation will impact the forensic science community by illustrating the need for pathological documentation of radiographic findings for courtroom testimony and for insisting on a multidisciplinary approach to injury interpretation.

The routine use of radiographic imaging in forensic medicine and its presentation in the courtroom is constantly increasing. Radiographic documentation of injuries in child abuse and gunshot wounds, for example, has become standard practice.<sup>1</sup> Proponents of the routine use of radiographic imaging have argued that its use could eventually replace standard autopsy examinations. Recent studies have questioned the reliability of radiographic imaging and interpretation in the medicolegal environment. Molina et al. have demonstrated that Computed Tomography (CT) scans have a low rate of accuracy and sensitivity to provide definitive diagnosis and description of injuries at a legal standard for the courtroom.<sup>2</sup> This presentation will discuss representative cases where radiographic and clinical interpretation of injuries were overturned by the autopsy findings.

**Case One:** A 19-year-old male, distraught over the break-up from his girlfriend, sustained a self-inflicted gunshot wound to the head. The patient received CT imaging on admission to the hospital and was removed from life support five days following admission. The family was opposed to autopsy and a limited examination was performed. The CT report opined that the entrance wound was located on the left temple. The examination documented the entrance wound on the right temple.

**Case Two:** A 4-month-old infant sustained a traumatic head injury with skull fracture. In court, the radiologist was unable to opine whether or not the fracture had crossed the suture line. The autopsy convincingly demonstrated the extension of the fracture in the suture with extension. The finding had significant medicolegal importance on the amount of force and mechanism of injury sustained by the infant.

**Case Three:** A 3-month-old infant had been hospitalized since birth for congenital heart problems, had been recently discharged, and had gone home. The infant was examined in the emergency room after being found dead. The radiologist and Emergency Room (ER) physician diagnosed an “acute, comminuted depressed fracture to the occipital skull.” A subsequent autopsy revealed overlapping of sutures due to chronic compression of the skull.

**Case Four:** A 5-month-old infant was found dead. Pre-autopsy radiographs and CT scan failed to identify any fractures. An autopsy confirmed the presence of abdominal trauma as well as a recent fracture of the inferior occipital skull.

**Case Five:** A 35-year-old male sustained a gunshot wound to the head during an altercation. He remained in a coma and died three weeks later. On receipt of the autopsy report, the prosecutor questioned the identification of entrance and exit wounds because they were “not consistent with the ER physician statement.” Upon further review, despite CT scans and radiographs, the ER physician had misinterpreted the wounds.

Radiographic identification and documentation provides an important adjunct to the forensic autopsy. The low sensitivity, reliability of interpretation, and radiographic resolution of injuries requires pathological confirmation to attain the legal standards. The traditional autopsy remains the gold standard for the identification and documentation of injuries. The admission of a single piece of radiographic evidence in the courtroom should be confirmed by another method. Radiographic evidence submitted in the courtroom should be interpreted by trained experts in the field.

### References:

1. Garry Peterson and Steven Clark, *Forensic Autopsy Performance Standards* (Atlanta: National Association of Medical Examiners, 2006).
2. Molina DK, Nichols JJ, and DiMaio VJM, “The Sensitivity of Computed Tomography (CT) Scans in Detecting Trauma: Are CT Scans Reliable Enough for Courtroom Testimony?” *J Trauma*, 63, 2007: 625-629.

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### X-Ray, CT Scans, Injury Interpretation