H97 3D-CT Imaging and Global Crime Scene Reconstruction in Forensic Ballistics— Two Case Reports

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After attending this presentation, attendees will have an enhanced understanding of 3D reconstruction of external and internal bullet tracks in case of gunshot wounds.

This presentation will impact the forensic science community by highlighting the value of virtual tridimensional reconstruction of both crime scene and Computed Tomography (CT) images to help in determining the course of events in forensic ballistics.

Postmortem investigations are increasingly assisted by Multislice Computed Tomography (MSCT). Over the past twenty years, these examinations, often termed *virtual autopsy* or *virtopsy*, have become more available to forensic pathologists. The aim of the presented study was to examine ballistic injuries using advanced radiological techniques and comparing the results with the autopsy findings. In cases of ballistic injuries, CT scanning and Three-Dimension (3D) reconstructions provide an accurate description of the bullet location, bone fractures, and, more interestingly, a clear visual of the intracorporeal trajectory (wound tracks). These forensic medical examinations are compared with tridimensional bullet trajectory reconstructions made by forensic ballistics experts.

The implementation of tridimensional methods and the results of the global crime scene reconstruction is shown through two case reports.

Case 1: A 33-year-old woman was shot in the shoulder by a twelve-gauge smooth-bore firearm with slug ammunition (Brenneke). The 3D-MSCT revealed the presence of numerous bullet and bone fragments and a trajectory of anterior-posterior, right-to-left. Two wound tracks were identified: the primary track that coursed from the entrance to the exit wounds; and a secondary track that terminated with small bullet fragments. The examination allowed the isolation of two possible scenarios for the external bullet trajectory. Both were modeled with the appropriate software. The confirmation of internal and external bullet trajectories confirmed the defendant version and showed the incompatibility of the victim's initial statements with the forensic findings.

Case 2: A 32-year-old man was found in a burned car with burn injuries corresponding to a Crow-Glassman level 3. A bullet (full metal jacket with lead core and brass jacket, .25 ACP) was found in the skull. The 3D-MSCT revealed a linear cranio-encephalic trajectory, strictly horizontal and right-to-left. The 3D crime scene reconstruction compared with forensic medical examination presented the best scenario, which was a shot from outside the car.

These case reports highlight the usefulness of CT imaging techniques for the reconstruction of ballistic trajectories. Virtual autopsy can be used to reliably reconstruct gunshot wound tracks, which are generally linear tissue defects associated with gas, bone, and metallic fragments. Postmortem CT imaging is, therefore, an important and useful complement to the forensic autopsy. Work collaborations between police forensic experts and forensic medicine institutes allow the incorporation of medical examination in a global crime scene reconstruction. CT imaging reconstruction is an interest in forensic science, and it's also a clear visual communication tool between experts and the court.

Forensic Ballistics, 3D MSCT Reconstruction, Bullet Trajectory

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