



G2 Machinery-Related Occupational Death: The Relevance of Workplace Investigation and Antemortem Radiological Data in Forensic Reconstruction

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After attending this presentation, attendees will have a clear example of the utility of radiological data and workplace investigations in reconstructing work-related deaths.

This presentation will impact the forensic community by demonstrating the importance of taking into consideration radiological data (x-rays, computed tomography or nuclear magnetic resonance) obtained at hospital admission and of performing a detailed work-place investigation when a work-related incident must be investigated.

A “work-related death” is defined as “A person who was fatally injured as a result of, or who died of a fatal condition caused by, exposure to their own or others’ activity or work factors; or who was fatally injured whilst travelling to or from work.”

In 2002, 1,478 Italian workers died from work-related injuries. In the same year 5,475 United States workers died due to traumatic injuries related to their work.

There are many potential contributing factors to any work-related incidents, including aspects or characteristics of the working systems, the equipment and material used, the environment, and the worker. For these reasons it is very important to verify if any malfunctioning equipments or any lack in safety measures have played a role in the occupational injuries.

In many cases reconstructing the event can be difficult because of the lack of detailed information about the circumstances of the incident and the design description of the machinery. Furthermore, the victim may not die at the workplace, but is admitted to the hospital and undergoes neurosurgery. In such cases neurosurgeons, removing skull fragments and generating new fracture lines, can complicate forensic examination and sometimes prevent a clear identification of the etiology of the lesions.

A case of a 40-year-old man who was involved in an injury while performing his job in a manufacturing industry will be presented. The victim, found unconscious by a colleague, was immediately transported to the general hospital. In the emergency room he presented with severe cranial trauma with bilateral skull fractures, a subarachnoid hemorrhage, and multiple cortical and intraparenchymal contusions. Despite urgent craniotomy and neurosurgical treatment the man died due to increased intracranial pressure.

Forensic autopsy revealed:

- the laceration of the right ear;
- a curved surgical sutured incision at the left side of the head;
- a lack of part of the left parietal bone due to the craniectomy;
- a linear fracture of the right parietal bone;
- massive subarachnoid and fourth ventricular hemorrhage;
- hemorrhagic necrosis of the pons and medulla oblongata.

There were no witnesses watching the accident and the pictures of the work place did not help the reconstruction. Moreover, the findings collected at autopsy did not allow investigators to establish whether the skull had been struck by a blunt object or had hit the ground violently, preventing a clear identification of the etiology of the cranial fractures.

To analyze the morphology of the fractures and their location a three-dimensional (3D) reconstruction (surface shaded display, SSD) based on CT scans performed at admission to the emergency room was employed. The analysis revealed a depressed skull fracture involving the left sphenoid and temporal bones with penetration of bone fragments in the left temporal lobe.

With the new information gained from the 3D-CT reconstruction of the skull, a second work-area investigation was performed. The fit-matching analysis between the components of the machinery and the depressed skull fracture permitted to identify a metal parallelepiped as the cause of the cranial staving and to reconstruct the event.

This case underlines the importance of taking into consideration radiological data (x-rays, computed tomography, or nuclear magnetic resonance) obtained during hospital admission and of performing a detailed work-place investigation when a work-related incident must be investigated and reconstructed.

Machinery-Related Occupational Death, Forensic Radiology, Work- Place Investigation