G51 A Homicide Due to a "Disguised Mail Bomb"

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Attendees will learn about a case of a homicide due to blast injuries from a bomb disguised as a package in the mail." The goal of this study is to underline the importance of the cooperation between the forensic pathologists and the forensic laboratory section in cases of death due to explosion and the importance of the use of confocal microscope to identify the exact origin of the material present in skin samples.

This presentation will impact the forensic community and/or humanity by demonstrating the importance of histopathology in explosive-related death and the application of confocal microscope to support investigation to clarify the circumstances surrounding the death.

Explosive-related deaths fall into three types: accident, homicide, and suicide. Homicidal explosive deaths, although rare, are often associated with acts of terrorism.

An explosion following the opening of a mail package addressed to his father wounded a young Italian man. The boy was quickly taken by ambulance, but was declared dead before he arrived at the hospital. At the crime scene, along with biological material, several small and large pieces of yellow mail paper, metal, and glass fragments, and numerous shotgun pellets were collected.

Prosecutor arranged the autopsy on the body to clarify the exact mechanism of death and the correlation with the type of bomb. While undressing the body a gunshot pellet was discovered, but a preliminary total body radiographic examination exhibited no radiopaque metallic pellets within the body. A complete autopsy was performed. A large number of abrasions, burns, and contusions were present on the face, the anterior part of trunk, and upper and lower limbs. Additional solid gray metal fragments and white-gray granular material were deposited throughout the facial and trunk injuries. Eyebrows, eyelashes, head and trunk hair, were singed. Blast injury was present to left hand with skin loss, and to right hand with skin and bone loss. The posterior surface of the body was not injured. The internal examination showed confluent bruising of lungs and a band-like pattern related to the overlying ribs, bruising of the abdominal wall, both the skin and the underlying muscles, 900 cc of blood in the peritoneal cavity; extensive bruising of the gut and the mesentery; and lacerations of liver and spleen were present. Examinations of other organs were unremarkable; no fractures of ribs and sternum were detected. Routine histological investigations, applying hematoxilin and eosin staining, were performed on all organs samples. Lungs sections showed alveolar ruptures, thinning of alveolar septae, and enlargement of alveolar spaces, subpleural and intraalveolar hemorrhages, venous air embolism and soot aspiration in smaller bronchi. Fat red staining, used to document the occurrence of pulmonary fat embolism, was negative. The air embolism were confirmed by the positive results to the immunohistocemical stain for fibrinogen and CD 61 (platelet glycoprotein III a). Liver and spleen sections showed intraparenchimal diffuse hemorrhages. Samples of soot collected from the skin of face, and trunk showed a detachment of the upper epidermal areas, longitudinal elongation of the cells and nuclei of the basal cells. The cutaneous heat injuries were confirmed by the positive results by the immunohistochemical dye for HSP 90-70-27. Except for brain edema and generalized haemostasis, examination of other organs was unremarkable.

The skin samples were also examined with a light microscope, in transmitted bright field illumination and phase contrast mode, and with confocal microscope using auto-fluorescence emission of skin and metal deposited on corneum stratum and fixed in lower layers of epidermidis; a three-dimensional reconstruction of samples was performed. Fragments of the mail package were analyzed by Forensic Laboratory Section of R.A.C.I.S. (Raggruppamento Carabinieri Investigazioni Scientifiche - Grouping Scientific Investigations Carabinieri).

The trigger mechanism of the bomb was connected in turn to an electric blasting cap; such a setup affords subsequent detonation of the device. The package was a typical "disguised bomb" with the explosive contained in an innocuous appearing container.

According to the autopsy findings and histological data, death was attributed to primary blast injury (PBI). The primary blast injury arises from the overpressure of the wave that crushes the body and damages the air containing organs directly, and other organs indirectly.

The investigation of explosion-related fatalities can be a substantial challenge in forensic casework. Determining whether the mode of death is suicide, homicide, or accident in such cases can present an especially difficult task to the forensic pathologist.

Therefore the detailed forensic investigation performed with autoptical and histological findings, and

the study of metal fragments present in the skin using a confocal type laser profile microscope at the same time the analysis of the bomb package permitted the exact reconstruction of the homicidal explosion.

Blast Injury, Confocal Microscopy, Disguised Bomb

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