E89 Multiple Implications of Postmortem Computed Tomography (PMCT) in the Forensic Approach to Charred Bodies

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Learning Overview: The goal of this study is to carry out an operating protocol that provides the radiologist with keys to establish complete and focused reports in all cases of PMCT of burn victims. The radiological investigation will be addressed according to the specific needs of the case in order to differentiate between normal postmortem changes from heat-related changes and to help the pathologist in different issues ranging from the victim's gender identification to localization, foreign bodies, or possible sites for fluid and DNA sampling.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by using the results obtained to optimize, validate, and promote the operative protocol used in such a way that it can be consistently applied in all cases of burned/charred bodies. According to the needs, the radiologist must discern all contextual divergences with forensic history, and must be able to report all relevant elements.

Although a fire generally does not completely destroy a body, in forensic pathology the correct examination of a burned/charred body is a challenge. Over recent years, imaging methods have gained ground in all fields of forensic pathology, where PMCT prior to postmortem has proven useful as an accessible and contemporary tool for forensic investigations. By using PMCT, important information supplementary to the traditional postmortem is obtained. In addition, PMCT provides insight into areas not routinely investigated during postmortem, such as the facial skeleton, basilar skull, cervical spine, arms, and legs. Furthermore, PMCT provides many others advantages, such as objectivity, repeatability, and 3D rendering of the body surface, allowing the pathologist to choose the dissecting technique most appropriate to the characteristics of the case, avoiding improper techniques that can led to damage of the examined structures or loss of important elements. An advanced state of carbonization often complicates surgical dissection and some foreign bodies (bullets, prostheses, etc.) or bone alterations (osteosynthesis, traumatic fractures, etc.) could be missed. PMCT provides specific semiologies requiring a prudent understanding to differentiate between normal postmortem changes from heat-related changes and can help the pathologist in the victim's identification process, guiding him in the autopsy, and in the localization of possible sites for collecting DNA or fluid samples. It is also important to perform histological examinations to highlight the presence of fat embolisms in the lungs as a sign of vitality at the time of burn.

The main objective is to use the results obtained to optimize, validate, and promote the operative protocol used in such a way that it can be consistently applied in all cases of burned/charred bodies. According to the needs, the radiologist must discern all contextual divergences with forensic history and must be able to report all relevant elements, in order to answer the following questions: Are there tomographic features that could help identify the victim? Personal Identification: Point out the presence of metallic objects stuck inside the body that are highly radio-opaque and thus easily seen on the PMCT (jewelry, watches, etc.). Personal Identification: Point out the presence of internal medical devices that are useful when reported in order to correlate with the medical record of the alleged victim (vascular prosthesis, osteosynthesis equipment, dental fillings, surgical clips, pacemaker, intra-uterine device, etc.). Gender Identification: In extreme cases in which the corpse is in such a damaged state that the victim's secondary sexual characteristics are no longer distinguishable and the gender can no longer be defined. Nevertheless, the deep organs are relatively preserved from the heat by the abdominal wall or peritoneum. Thus, the uterus or prostate are generally present on PMCT, allowing a determination of the subject's gender. Is there evidence of remains of biological fluids in liquid form available for toxicological analysis and DNA sampling? (The collection of fluid samples, during the autopsy, is particularly important in the case of a charred body. In addition to the usual toxicological screening, forensic personnel would seek to ascertain the percentage of serum carboxyhemoglobin in order to determine whether death occurred before or during the fire. The availability of biological fluids is inversely related to the burning level of the body and the main risk is that the few biological fluids present could be lost during the surgical dissection. A detailed imaging analysis of the PMCT can be extremely useful to point out possible collection sites). Is there another obvious cause of death other than heat-related lesions, especially metallic foreign bodies of ballistic origin? PMCT will show the presence of foreign bodies (bullets, knives, blades, etc.) or radiological findings different from typical heat-related lesions (bone fractures different from typical heat-related fractures, epidural collections with a subdural appearance, etc.) that are capable of causing traumatic death. What are the characteristic burn-related injuries seen on the corpse that should be sought during the autopsy?

Postmortem Computed Tomography, Charred Bodies, Forensic Science