D5 Forensic Investigative Issues in a Fireworks Production Factory Explosion

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Learning Overview: After attending this presentation, attendees will understand the importance of: (1) a multidisciplinary expertise in the reconstruction of the dynamics of explosive events, and (2) a thorough study of the lesions detected in relation to the injury mechanisms produced in order to ascertain the cause of death.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by highlighting the important contribution of the forensic investigations in particular cases, such as explosions, to the determination of manner and cause of death, when properly combined to the information provided by different professional figures.

Fireworks are used all over the world for both public and private celebrative events. Although they are commonly considered safe items, accidents are not infrequent, especially when they are managed by inexperienced people. The most relevant damages occur within production factories, either for the lack of safety regulations or the employment of untrained staff, with a subsequent high social and economic impact in terms of morbidity and mortality. Fireworks-related accidents are mostly accidental, although sometimes, depending on the circumstantial data and judicial investigations, an intentional nature must be suspected. In such a context, an adequate engineer expertise becomes of utmost importance to shed light on the dynamic of the event. When such information proves compatible with the forensic investigations—site and position of the bodies, lesions detected and compatibility with the injury mechanisms produced by the explosion—as well as with the circumstantial data provided, the intentional or accidental nature of both the explosion and deaths can be ascertained.

The importance of such aspects is highlighted in the present work, which reports the case of a fireworks production factory explosion in which seven people became involved: four of them, three of which engaged in the installation of sliding gates to the factory buildings, died immediately; a man, engaged in the same task, died while transported to the nearest hospital; the remaining two people survived. According to the preliminary judicial investigations, contracts had lately gone on between the factory's owner and a worker hired without a regular contract. For this reason, an intentional explosion was suspected, and an engineer survey was requested. The factory consisted of a total of 16 buildings: buildings number 6 and 7 were completely destroyed by the explosion, and building number 8 also caught fire; all the other buildings were affected by minor damages. The corpses of two of the victims were found nearby the buildings number 6 and 7; several body parts of a third victim were found spread in the area surrounding the same buildings and collected; the fourth victim's corpse was found quite completely charred in proximity of building number 8. Following the survey of the fire investigative unit engineer, the dynamics of the explosion were elucidated: a first explosion occurred in building number 7, where four workers were engaged in the installation of a sliding gate, due to a deflagration caused by welding sparks in an area with a combustible-oxidizing atmosphere. The ignited atmosphere thus acted as a fuse for a domino effect, mainly affecting buildings number 6 and 8 (used, respectively, aa fireworks deposit and a fireworks production station), which were very close to building number 7. The positions of the bodies and the lesions detected were compatible with the described dynamic, with four victims dead from the explosive effects and one from fire-related charring. All engineering findings were compatible with an accidental explosion occurring during welding activities for the installation of sliding gates; the intentional hypothesis was then rejected.

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