



H153 Two Firework Fatalities in North and Central Texas

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Learning Overview: The goal of this presentation is to educate medical examiners and forensic investigators of the range of findings in firework fatalities.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by educating those involved in investigation of potential firework deaths regarding the range of possible findings.

Upon completion of this presentation, viewers will have gained exposure to rare instances of fireworks fatalities, readily recognize patterns of external injury, and list potential causes of death in these cases. Cases examined by the Tarrant County Medical Examiner's Office, Fort Worth, TX, will be discussed in depth.

Independence Day fireworks displays are a tradition in the United States. Although most accidents involving fireworks result in blast or thermal injuries of varying severity, two cases of accidental death investigated at the Tarrant County Medical Examiner's Office showed additional findings of interest.

In July of 2019, a 19-year-old male partook in a deadly game of fireworks war with friends that resulted in his sudden death. The subject ignited his weapon of choice, and an unexpected explosion caused a severe blast injury to his left hand. In addition to the blast injury of the hand, external examination revealed superficial wounds of the central chest, believed initially by some to be attributable to the LUCAS® chest compression device used during resuscitative efforts. Closer inspection revealed a thermal injury in a circular pattern superior to the resuscitation injury. Internal examination exposed fracture with associated hemorrhage of the sternum. Additionally, there was 550mL of blood in the pericardial sac, rupture of the anterior wall of the left ventricle, rupture of the posterior wall of the left ventricle involving the aortic valve, and rupture of the interventricular septum. The cause of death was blunt force injury of the chest due to fireworks explosion. The manner of death was ruled as accident.

A police vehicle dash camera caught the explosion on film; however, it was too far away to show details of the incident. Examination of the scene revealed a cylindrical pyrotechnic device status post-combustion with the clay seal separated. This finding corroborated the witness accounts indicating that he was holding the firework up to his chest, pointing it outward at his friend when it exploded, ultimately providing the mechanism for the pattern of injury on the victim's chest.

In July of 2014, a 51-year-old male was killed in a fireworks incident that resulted in three additional injuries. In preparation for a Kiwanis® event, seven people were unloading fireworks and placing electric matches into six-inch fireworks shells at the rear of a trailer. During the process, a shell became live and detonated. The shell caused other shells to ignite and spread to the open trailer, igniting the majority of the fireworks still in the trailer. The fire then spread to other nearby combustibles, two vehicles, and the trailer. The trailer showed no signs of detonation; instead it had melting of the metal frame, siding and structural components. Investigation could not exclude accidental activation of a defective electric match, improper handling of electric matches or fireworks, or accidental activation of the internal firework fuse by friction caused by metal scissors during the process of installing the electric match.

The decedent was examined at the office and displayed extensive thermal injury, cherry-red discoloration of soft tissues and viscera, and soot in the airways with a carbon monoxide level of 16%. In addition, there was penetration of the neck by a foreign object that injured the internal and external jugular veins at the brachiocephalic vein. There were fragments of laminated pressed cardboard and clear plastic along the wound track. The cause of death was ruled as inhalation of smoke and penetrating injury of the neck due to fireworks explosion. The manner of death was ruled as accident.

In the 2018 Fireworks Annual Report, the United States Consumer Product Safety Commission (CPSC) reported that most fireworks injuries and fatalities seen in emergency rooms occur during the month surrounding July 4.¹ Hospital emergency departments treated approximately 9,100 fireworks injuries. An estimated 62% (5,600) of those injuries treated occurred during the month surrounding Independence Day. The most frequent injuries treated involved the hands and fingers (28%), followed by injuries of the legs (24%) and injuries of the eyes (19%). Only five deaths attributed to fireworks explosions were reported at the time of the CPSC's Annual Report.¹

Reference(s):

- ¹ United States of America Consumer Product Safety Commission. 2018 Fireworks Annual Report. *Fireworks-Related Deaths, Emergency Department-Treated Injuries, and Enforcement Activities During 2018*.

Firework, Explosion, Fatality