D89 Blast of a High-Pressure Water Pipeline: A Fatal Case With Sternal and Heart Rupture

Roberto Guarino, MD, Via del Vespro 127, Palermo, ITALY; Letizia Averna, MD, Via del Vespro 129, Palermo, 90127, ITALY; Antonina Argo, PhD, Via del Vespro 127, Palermo, 90100, ITALY; Salvatore Moscadini, MD, Via del Vespro 129, Palermo, 90127, ITALY; and Paolo Procaccianti, PhD, Via del Vespro 127, Palermo, 90100, ITALY*

After attending this presentation, attendees will understand effects of injuries resulting from a rare work accident of a welder at the local water main management company.

This presentation will impact the forensic science community by showing the causal chain between a high-pressure water jet and thoracic trauma with sternal fracture and heart rupture.

It's the case of a 47-year-old man, who was performing a preliminary inspection to repair a micro-lesion, a few centimeters in diameter, of a high-pressure water pipeline. While the worker was going close to the conduit, a high-pressure water jet widened the gap of the pipeline wall, and squirted through the breach, hitting him in the sternal region, lifting him into the air, and throwing him about 25 meters away, to a lower level with a drop of about five meters. From the testimonies of colleagues, evidence suggests that the subject performed a parabolic flight, swirling with limbs abducted, then landed on his feet, leaving two deep footprints on the ground which were found near the corpse, rebounded, and was found in a supine position.

The external examination didn't show significant injuries except two linear abrasions in the breast region and a compound fracture of the right leg. A full-thickness fracture of the sternum and a fracture of the anterior wall of the left ventricle were discovered during the autopsy. There were also multiple rib fractures on the right rear arch.

Closed thoracic trauma with sternal fractures and visceral injuries may result through three different mechanisms: direct impact injuries, by deceleration, and by compression. Most trauma affects the thoracic wall in a more or less severe way, followed by pleuro-pulmonary injuries; less frequent are heart, diaphragmatic, and esophageal lesions; the rarest are the aorta and great vessels diseases. Sternal fractures are rare. The most common causes are represented by road trauma, involving deceleration injuries, and direct trauma to the anterior chest wall. Indirect mechanisms are the rarest, represented by hyperextension of the trunk or by violent contractions of the muscles of the neck (sternocleidomastoid) and of the trunk, which can occur in several conditions (physical exercises, coughing, vomiting, etc.).

In this case, the damaging mechanism is atypical and seems to be unique in literature: the impact of a high-pressure water jet behaves like a breast injury similar to a direct trauma with a strong damaging power. The found lesions, above all the sternum and the heart, are quite similar and comparable to injuries due to direct trauma caused by a traffic accident or by a direct impact of the chest against a large area.

Bone and visceral lesions are due to the detrimental action of the high-pressure water jet that struck the subject on the anterior chest region. This study presents this case, comparing it with the literature, which was very poor regarding this theme, focusing particular attention on the damaging mechanism that acted on the bony and visceral structures, especially demonstrating the correct causal chain through the ergonomic engineering expert report.

Thoracic Trauma, Heart Rupture, Water Jet

 ** Presenting Author*