D8 Accidental Death Resulting From Acetylene Cylinder Impact

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After attending this presentation, attendees will learn the scenario of occupational injuries in a developing country like India. This presentation will impact the forensic community and/or humanity by providing a better understanding of the blast effect from a low impact explosion and better recommendations for occupational safety.

Case report: A 34-year-old male welder sustained injuries resulting from the impact by the upper part of acetylene production and storage cylinder while examining the gas pressure. The valve (V) in this device had rusted, allowing the build-up of dangerously high pressure of acetylene gas. He went on infusing calcium carbide into the cylinder, until the rising pressure within it caused the explosion. In this explosion, the upper part (U) of the device blew out and struck him on the face. At the time of the incident, he was bent over the device, supposedly checking the apparatus. This caused his upper part of the body – including the face – to be exposed to the full blast of the explosion.

After the incident the upper part the cylinder along with the victim was found lying at a distance of about one and half feet from the lower container as shown in figure 3. The body of the welder was lying in a pool of blood as shown in figure 4. The body was shifted to the mortuary of Maulana Azad Medical College, Delhi for the autopsy.

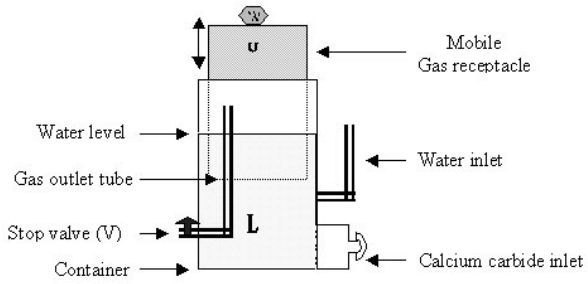

Figure 1. Schematic diagram of
The improvised acetylene tank

Autopsy findings: On examination of the body, dried blood was seen adherent to the head, face, neck, and chest. Blood was oozing out from both nostrils. Multiple abrasions were present over the right ear, face, front of neck, and upper chest with a black eye on the right side. Multiple lacerated wounds were present over the lower lip and chin (figure 5). There were multiple bruises over the face, front of neck, shoulder, upper chest (figure 6) and left buttock. There were multiple fracture dislocations of maxilla and mandible, along with loosening of upper incisors. There was transection of trachea, vessels and bruising of neck muscle above the thyroid cartilage (figure 7). There were bilateral sterno-clavicular and acromio-clavicular joint dislocations and multiple fractures of all the ribs accompanied by effusion of blood around. A contusion about 8x6 cm was present over the frontal area of scalp. There were fissured fractures of anterior cranial fossae of the base of skull. Brain showed contusion laceration of the undersurface of both frontal lobes. Sub-dural and subarachnoid hemorrhage was present all over the brain parenchyma. There were no lesions to the other internal organs and all toxicological analyses were negative.

The autopsy results showed that the death has been caused due to hemorrhagic shock and cranio-cerebral damage consequent upon injuries to the neck structures and head respectively. The injuries were produced by blunt force impact to head and neck resulting from the accidental impact of an acetylene cylinder.

In the present case, the examination of the cylinder revealed the rusting of several components of the cylinder – including the safety valve. The cylinder was country made and did not adhere to the specifications issued by Bureau of Indian Standards (BIS). It was in use for more than 10 years and service and repairs were pending. The rusting of the components decreased the free movement of the cylinder along with the rusted release valve. There was an increase in pressure of more than 15psi, resulting in degradation of acetylene and non-functioning of oxy-acetylene flame. Due to lack of knowledge the welder infused more chemical

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reaction to increase the supply of acetylene gas. The explosion occurred as he checked the gas pressure and increased it manually. Explosion of the cylinder led to the flying off of the upper part of the cylinder, which hit the welder on his head, neck and chest. The external injuries off the welder corresponded to the detached upper part of the acetylene cylinder.

Reference:

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Acetylene, Cylinder Blast, Blast Effects

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