Double Death Electrocution in the Bathtub

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CASE SUMMARY

We report the case of a 25-year-old woman and her 3-year-old son who were found dead in the bathtub because of electrocution. The case happened in August, which is winter, in South Africa. An electrical urn used to heat the bathwater was plugged into the mains and apparently fell into the water. The chrome taps contacted the shoulder of the woman and provided a pathway for the electrical current. Both mother and child died from electrocution, although the child showed signs of drowning. This case is unique in that it represents a double death due to electrocution in a bathtub.

At the scene, inside the bathroom of a suburban house, 2 bodies lying side-by-side were present. Initially, the bodies were covered with a blanket by the next of kin. An electric metal urn, containing minimal water, was noted on the edge of the bathtub plugged into a plug point installed inside the bathroom.

The naked bodies of a woman and a boy were observed lying inside the water-filled bathtub. The bodies were cold to touch, and the water was cool. The water-level mark could be clearly identified on the skin of both bodies, as evidenced by well-defined, as well as fixed, lividity/hypostasis. Rigor mortis was present in the large muscle groups (Figs. 1–3).

FIGURE 1. A 25-year-old woman and her 3-year-old son who were found dead in the bathtub because of electrocution (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

FIGURE 2. Upon inspection, naked bodies of a woman and a boy were observed inside a water-filled bathtub. At the outset of the examination, both bodies were covered with a blanket (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

FIGURE 3. The woman was observed lying supine along the length of the bath with the posterior region of the body submerged in the water, and a defined water level line and hypostasis were observed. The body of the boy was also present inside the bathtub lying longitudinally prone between the one free wall of the bathtub and the right side of the body of the woman (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

The bodies were lying next to each other and longitudinally along the length of the water-filled bathtub (Figs. 4–6).

FIGURE 4. An electrical urn was used to heat the bathwater. The urn was plugged into the mains and apparently fell into the water (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

FIGURE 5. Inside the bathroom, a metal urn containing minimal water was noted on the edge of the bath plugged into a plug point installed inside the bathroom (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

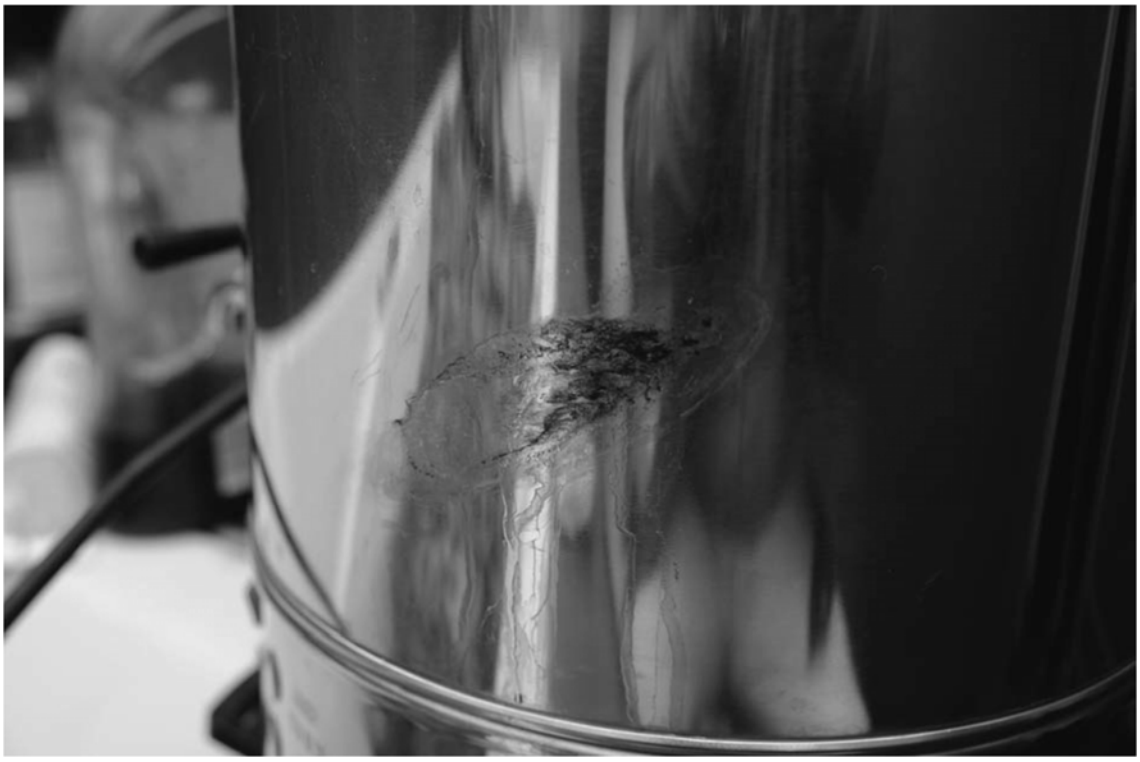

FIGURE 6. An injury consistent with an electrothermal injury was observed on the left leg. A mark corresponding with this injury was observed on the side of the urn (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

The female body was lying supine with the back of the body submerged in the water. A well-defined water level mark with lividity/hypostasis was observed on the posterior aspect of the body. The head was above the water with the right ear and right shoulder in contact with the chrome metal tap. A plume of white froth was present at the nostrils. Electrothermal injuries were observed on the left leg, which corresponded with a mark on the one side of the electrical urn. Electrothermal injuries were also observed on the right ear and right shoulder. No other external injuries were observed upon initial inspection of the body (Figs. 7–9).

FIGURE 7. An injury consistent with an electrothermal injury was observed on the left leg. A mark corresponding with this injury was observed on the side of the urn (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

FIGURE 8. Electrothermal injuries were observed on the right ear and right shoulder (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

FIGURE 9. Electrothermal injuries were observed on the right ear and right shoulder (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

The body of the boy was wedged between the one freewall of the bathtub and the right side of the body of the woman. The boy's face was fully submerged within the water with a plume of blood tinged froth noted within the nostrils and mouth. A clearly defined water level mark with fixed lividity/hypostasis was observed on the anterior aspect of the body. Initial cursory examination at the scene showed an electrothermal burn wound on the right foot. No other injuries were observed upon initial external examination of the body (Fig. 10).

FIGURE 10. The body of the boy was also present inside the bathtub lying longitudinally prone between the one free wall of the bathtub and the right side of the body of the woman. The deceased's face was fully submerged within the water with a plume of blood-tinged froth noted within the nostrils and mouth (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

Because this was deemed an unnatural death, medicolegal autopsies were arranged in accordance with the national regulations.

Autopsies were performed the following day (within 24 hours). The female body showed electrothermal, contact burn wounds on the right side of the face, right upper limbs, and left lower limbs (Fig. 11). Features were suggestive of “grounding” injuries. A well-defined water level mark with fixed lividity/hypostasis was distributed on the back of the body. The lungs were congested and edematous (the left and right lungs weighed 430 g and 522 g, respectively). Internal findings were nonspecific (asphyxial findings).

FIGURE 11. At the scene, the woman showed electrothermal, contact burn wounds on the right side of the face, right upper limbs, and left lower limbs. The chief pathology was found on the external aspects of the body consistent of electrothermal burn wounds at areas of "grounding" (photographs courtesy of Captain Thierry Werner Beheydt, Provincial CSI, Gauteng, and Dr Bathabile Soul).

The body of the boy showed an electrothermal burn wound on the right foot. A clearly defined water level mark with fixed lividity/hypostasis was noted on the anterior aspect of the body. The lungs showed signs suggestive of emphysema aquosum (the left and the right lungs weighed 114 g and 142 g, respectively).

Histological examination confirmed the macroscopic findings for the mother and the child.

DISCUSSION

The bathroom is a common site for electrical tragedies. Accidents, suicides, and even homicides occur there because of its vulnerability to electrical shock. Accidents are common, usually as a result of the careless use of electrical appliances, such as hairdryers and room heaters.[1] Because of this danger, most countries have strict regulations about electrical installations in bathrooms. We report the double death of an accidental electrocution due to a water heating element.

According to an article by Budnick,[2] from 1979 to 1982, in the United States, at least 95 persons were electrocuted in bathtubs; 66% of the deaths occurred during the winter and spring. Children younger than 5 years had the greatest mortality rate, and hair dryers were responsible for 60% of the deaths.[2]

A case of electrocution in a bath was reported by Mackenzie in 1995. A wife was found dead by her husband, lying in a tiled bath on a cast concrete floor with a 1-kW electric radiator immersed in the bath water. Initially, the case was treated as accidental death, but the police charged the husband with murder on the grounds that his wife could not have

died in the manner he described. Subsequent investigation showed that the bath had a low resistance to earth, and there were faults in both the house wiring and the radiator cable, which together with a high blood alcohol content, produced a fatal chain of events.[3]

Saukko (2016)4 also reported the case of a homicidal electrocution in the bath. A young woman was found dead in her bath, slumped forwards in a kneeling position with one breast resting against a chrome tap. The left arm was trailing over the edge of the bath, in which the usual level of water plus an electric fan heater were immersed near the feet. The heater was connected by a long cable to a 240-V, 13-A socket in an adjacent bedroom. Significantly, the third “earth” wire had been deliberately disconnected from the earth pin inside the plug. The woman's husband, after several denials, eventually confessed to dropping the heater into the bath.[1]

Hardon et al[5] presented the case of a patient with low-voltage electrical burns due to smartphone use in a bathtub. The 13-year old patient was using a smartphone plugged into the electrical grid while taking a bath. The patient survived, although suffered burn wounds. The right hand sustained a burn wound between the thumb and index finger. There was also a stripe-shaped burn over the abdomen near the epigastric region. There was probably direct conductance between main voltages to a grounded element in the bathtub, such as the drain. Another explanation is that the current flowed over the outer side of the charging cable, which was moist, to the patient. Moist skin is more vulnerable to electrocution injury because of decreased resistance.

The severity of burn injury due to electrocution depends on the factors of electricity and the human body. The type and intensity (that is, the voltage) of the current, the location and duration of contact on the body, and the organs affected are factors.[6,7] The severity of burn injury due to electrocution can be explained by Ohm's law, in which the current is inversely proportional to resistance. Forensic experts need to keep Ohm's law in mind when reconstructing the mechanism of injury.

Forty-eight (48) cases of electrocution in the bathtub were reported in Düsseldorf and Göttingen from 1972 to 1986; marks of electricity were found in 8 cases. Five cases were distinguished by linear marks indicating the water level, and in 10 cases, a peculiar restriction of the postmortem hypostasis on the submersed areas could be seen. The authors presumed from their own material that the latter findings can be easily ignored. Because linear circumscribed lividity could not be detected in bath deaths without electricity, it may be a specific finding. The authors recommended that more attention be paid to this phenomenon. In all of their cases, 220 V current was involved, that is, the usual household supply. The calculated amperage was about 100 to 250 mA, which means that ventricular fibrillation occurred within a few seconds. In 14 cases, foam was established at the mouth and the nostrils, or in the air passages. We presume that, in these cases, death by electrocution was finally superimposed by drowning without developing the typical emphysema aquosum.[8]

Macroscopic findings on the body in an electrocution in the bath may leave a lividity impression of the level of the water, as described by Bonte et al.[7] Injuries may also include grounding or earthing marks on the body such as where the body touched the chrome taps or earth.

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