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## Suicidal Hanging on High-Voltage Line Pylon

**ABSTRACT:** Hanging is one of the most frequent methods for suicides among young males. This report presents two cases of suicide by hanging on pylons carrying high-voltage power lines. The male victims suffered electrocution while committing suicide. Electrocution was the cause of death in both cases, however in one case blunt force injuries from hanging contributed to death. In these two cases hanging was the intentional method of suicide and it was followed by electrocution. The cases demonstrate that scene investigation, a detailed autopsy with histology, and amamnestic data are essential in the evaluation of suicides by hanging and that the determination of the cause of death remains a challenge in investigating such cases.

**KEYWORDS:** forensic science, suicidal hanging, electrocution, medico-legal evaluation

Hanging is one of the most frequent suicidal methods with young or middle age male predominance (1,2). Most victims of suicidal hanging are found at home, the workplace, open fields, and hotels (1). Hanging is frequently chosen as a secondary or unplanned method in complex suicides (3), when the characteristic feature of the second form is that the first chosen method turns out to be ineffective, too slow or too painful. Therefore, the suicide is completed with another method with hanging being the most common (4,5).

We present two cases of suicidal hanging on high-voltage line pylon, when hanging was the planned and intentional suicidal method, followed by electrocution.

### Case No 1

#### *Scene Investigation*

The 26-year-old man was found in a public park, lying under a high-voltage electric line pylon (Fig. 1A). A 1.2 cm thick nylon rope was hooked around his neck, and the rope was torn (Fig. 1B). The upper end of the rope was fixed 15 m high. The length of the rope from the point of fixation to the running knot of the noose was 4 m. No final note was found by the police in the home of the victim.

#### *Autopsy Findings*

The autopsy revealed the body (height: 180 cm) of a male victim with a rope around the neck and marked postmortem hypostasis. A nylon rope was located at the upper cervical region with 2–3 cm below the mandible gonions. On the right palm, a yellowish dark, dried, deep injury was detected. On the left hand and left lower extremity, skin lesions, burns, and epidermal vesiculation were observed (Figs. 1C and 1E). Petechial hemorrhages were

found on the visceral pleura, on the surface of the lungs. There was a 6 cm × 1.5 cm lesion on the epicard (Fig. 1D). No other pathomorphological changes of any natural disease in connection with the cause of death were detected. Postmortem blood alcohol concentration (BAC) was 35 and 66 mg/100 mL alcohol was found in the urine. Pharmaceutical and drug tests were negative.

#### *Histology*

Histology samples were embedded in paraffin, cut into approximately 5- $\mu$ m-thick sections and stained with hematoxylin and eosin (HE). At the epidermal–dermal junction at the edge of the blister, the cytoplasm and the nuclei of the cells in the stratum basale were markedly elongated and hyper eosinophilic (Figs. 2A and 2B) and the dermal papillae displayed a festooning structure consistent with electric trauma. Myocardial nuclei showed a “square” aspect rather than the ovoid morphology seen in distended myocytes (Fig. 3).

#### *Cause of Death*

The electrocution likely was the lethal injury occurring as the person initiated the hanging event.

### Case No 2

#### *Scene Investigation*

The 22-year-old man was found in a public park, lying under a high-voltage electric line pylon (Fig. 4A). A 1.5 cm thick, 1.5 m long rope was hooked around the neck (Fig. 4B). The victim attempted suicide on several occasions before the fatal suicide. A final note was found by the police in the home of the victim.

#### *Autopsy Findings*

During the autopsy, we found a hanging rope around the neck of the young male victim (height: 182 cm). Petechial subconjunctival hemorrhages (Fig. 5A), subdural hemorrhage, several fractures on the thoracic column were detected. On the left lower extremity skin lesions, burns, and epidermal vesiculation were observed (Fig. 5B).

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FIG. 1—High-voltage electric line pylon as the scene (case no 1) of suicidal hanging (A), hanging rope around the neck (B), current mark on the right palm (C) epicard lesion (D), and left lower extremity (E).

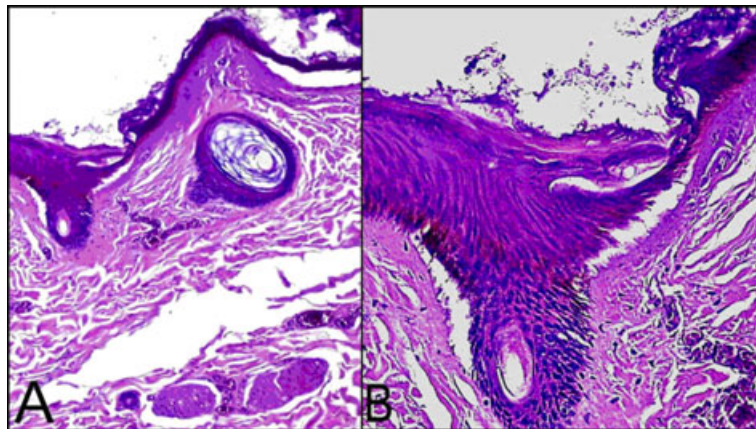


FIG. 2—Erosion and spherical vacuoles observable in the horny layer and elongation of the cell nuclei in the epidermis (A,B) (HE staining,  $\times 200$ ,  $\times 400$ ).

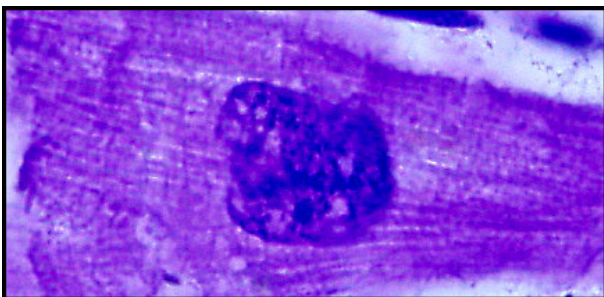


FIG. 3—Square myocardial nucleus (HE staining,  $\times 630$ ).

Rupture of the liver and spleen, thoracic aorta rupture (Fig. 5C), kidney subcapsular bleeding were found. Postmortem BACs and toxicology were negative.

#### Histology

In the skin of the left lower extremity, the cytoplasm and the nuclei of the cells in the stratum basale were markedly elongated and hypereosinophilic. In the parenchymal organs, severe bleedings and hypovolemia were observed.

#### Cause of Death

Electrocution played a major role of death process as well in this case, and the blunt force injuries would have combined them.

#### Discussion

Two cases with suicidal hanging and electrical marks caused by high-voltage lines are presented. Based on earlier reports hanging is the most common suicidal method in male victims (1,2). The



FIG. 4—The victim (case no 2) was lying under a high-voltage pylon (A), with the hanging rope found at the scene (B).



FIG. 5—Petechial subconjunctival hemorrhages (A), skin lesion, burns on the left lower extremity (B), thoracic aorta rupture (C).

distribution of hanging cases according to the place of suicide reveals the home, workplace, open fields, and hotels as being the most common (1), however, in the medico-legal literature, we could not find high-voltage electric pylon mentioned as the scene of suicidal hanging.

Although the important part of the postmortem examination of hanging cases is the search for vital findings, it is reported that detecting vital findings in hanging is problematic because of the fact that fatal trauma to the neck region is with very short survival period (1). In our cases, obvious vital signs of electrocutions were demonstrated after the suicidal hanging actions suffered on the electrical pylon. However, in these cases, the hanging process was completed by the victims, the final cause of death was determined as electrocution happening within a short period following the suicidal hanging. It seems impossible to collect information whether the electrocution was unintentional, unplanned or accidental.

Electrical shocks of 1000 V or more are classified as high voltage (6), the high-tension power lines have voltages of more than 100,000 V. The primary determinant of damage caused by direct effects of electricity is the amount of current flowing through the body, which can lead to fatal arrhythmias or apnea. Additional factors that determine damage include voltage, resistance, type of current, current pathway, and duration of contact with an electrical source. Tissues that have a higher resistance to electricity, such as skin, bone, and fat, tend to increase in temperature and coagulate.

High-voltage injuries commonly produce greater damage to deeper tissues, largely sparing the skin surface.

Various techniques have been applied to characterize the electric injury pattern in skin, ranging from histology (7), scanning electron microscopy (8), atomic absorption spectroscopy (9), and magnetic resonance imaging scans (10). Typical lesions, characterized by a break-up of myocardial fibers, could provide the structural substrate necessary to initiate chaotic, electrical asynchronous activity and could be induced by the passage of abnormal electrical current (11).

Detailed scene investigation, evaluation of environmental circumstances and careful postmortem examination are essential in differentiation between accidental, homicidal, and suicidal hangings (12). In the presented cases, the first and planned method was hanging, and in the second phase electrocution happened accidentally or unintentionally. In the first case, the cause of death was determined as electrocution after the hanging process. In the second case, the hanging was followed by electrocution and injuries of falling, the cause of death was hypovolemic shock because of traumatic aorta rupture. In complex suicides, more than one method is applied either simultaneously or one after the other. Consequently, a distinction is made between planned (primary) and unplanned (secondary) combinations (5). In complex suicide cases, the methods could be planned or unplanned, however, in our cases, hanging was intended and completed, and the electrocutions might have

happened accidentally. Accordingly, our cases could not be determined as classical complex suicides, preferably suicides with another unintentional method leading to fatal complications. Scene investigation, autopsy, and anamnestic data are essential in order to elucidate the manner of death correctly (4). Determination of manner of death and cause of death remains a challenge for the forensic investigation.

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