

## Suicidal Electrocution: A Case Report

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### Abstract

Most common electricity-related deaths in forensic practice are associated with accidents in domestic or industrial environment. Despite the fact that electricity is a readily available suicidal mean in developed countries, suicides by electrocution are relatively rare. Mostly suppose in individuals working in the electrotechnical industry or at home by "handymen". An autopsy findings are usually uncharacteristic, accompanied by pulmonary edema, fluid blood, organ congestion (suffocation signs). The passage of electric current through the body is confirmed by specific finding so-called current signs. In many cases, current marks are small, easily overlooked or unrecognizable, which significantly complicates the diagnosis and determination of the cause of death by a forensic pathologist. In some cases, it's possible to determine the suicidal electrocution only by the investigated circumstances or in cooperation with an expert in the field of electrical engineering. Authors warn of the potential risk that a person may be part of an active electrical circuit at the time of the finding. Knowledge of the victim's psychiatric and social history is an equally important part. The authors present the case of an 82-year-old man who, in a suicidal manner, constructed a suicide electric circuit in a social services home.

**Keywords:** crime scene investigation, electricity, electric current, electrocution, suicide

### Introduction

Suicide is a violent, unpredictable behavior of an individual. There are many ways of completing a suicide involving a wide range of factors affecting the current person's psychological status. In forensic practice, suicides committed by electrocution are rare. Incidence is often associated with the occupation and personal skills of individual. Most common place for

electrical tragedies, accidental or intentional (suicide or even homicide), is bathroom for its vulnerability to electrical shock. The conducive conditions include moist environment, grounding through metal taps and pipes and a wet, unclothed body. Different mechanisms can cause death in electrocution: ventricular fibrillation, tetanic respiratory spasm, and paralysis of the central nervous system respiratory centers<sup>12</sup>. The autopsy findings in electrocutions are

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otherwise not specific. The fatal electrocution may occur with no skin marks whatsoever, making the diagnosis entirely dependent upon the circumstances of the death. If one requires the presence of burns to make the diagnosis of low-voltage electrocution, one-third to one-half of the cases are likely to be misdiagnosed. That's why even small injuries of the skin should be sampled for histological and histochemical evaluation<sup>13</sup>. If suicide by electrocution is suspected, it's certainly worthwhile to take a look at the scene of death.

Herein authors would like to present a typical case of suicidal electrocution using commercially accessible electric cable with implemented switch. The psychological risk factors in this case included deteriorating health state, past occupation as an electrician, solitude in retirement's home and possible influence of COVID-19 pandemic to the victim. Authors emphasize the importance of crime scene investigation in cooperation with electrotechnical engineer to find out the mechanisms of fatal electrical circuit. The preventive role of forensic medicine is also to clarify the potential risk factors for physicians and personnel in social facilities, which are leading to such fatalities.

### Case Report

An 82-year-old-man was found lying dead on a bed in house of social services. His both wrists were wrapped around with duct tape (Fig. 1). On the inner part of both wrists were bare ("naked") electric wires under the duct tape (Fig. 2). These two electric wires were attached to the body and connected to the electrical switch (Fig. 3). They were electrically active even during the body discovery. In the personal belongings of the deceased, components essential to the creation of the electrical circuit were found. The investigation revealed that the man's occupation in the past was an electrician. His suicide note was found in his room. His depressive mood and thoughts were expressed there. The motive for suicide was deteriorating health state. External examination revealed on both wrists thermal burn skin lesions from heating of the epidermis and dermis as the current passes (Fig. 4). At autopsy, the morphologic changes were non-specific, they included subpleural

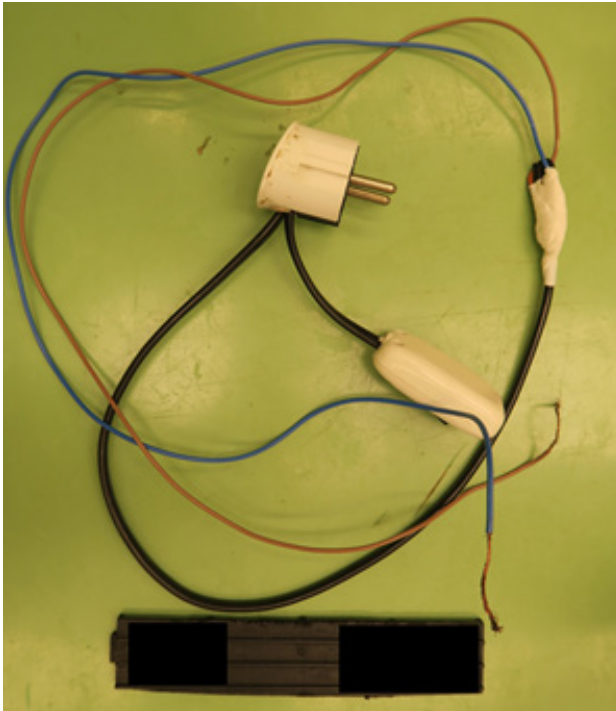
hemorrhages, dilated right part of the heart and pulmonary edema due to lethal ventricular fibrillation. Other than the internal findings described above, the autopsy examination showed serious heart disease with coronary artery bypass graft surgery (CABG) and pacemaker implantation. However, the severe sclerotic changes of the coronary arteries did not contribute to the man's death. Another person's involvement in the deceased's death was excluded. The result of toxicological examination was negative. Histological changes of the burned skin corresponded to the second- and third- degree local burns. Histochemical color test confirmed particular electrical conductor (copper and iron).



**Fig. 1. The body of 82-year-old man with self-made suicidal electrical mechanism.**



**Fig. 2. Detail focus on the inner part of wrist with bare ("naked") electric wires under the duct tape.**



**Fig. 3. The self-made suicidal electrical mechanism with electrical switch.**



**Fig. 4. The thermal burn skin lesions from electrical heating.**

### Discussion

Suicides have become almost everyday phenomenon in forensic practice. Variables influencing suicide incidence (except gender, age and season) include marital status, residence (urban/rural), employment or occupation<sup>4</sup> as well as coincidence with mental disorders associated with depression and chronic alcoholism<sup>4,5</sup>. Bioclimatological factors also might play a role in initiation and accomplishment

of suicide<sup>5</sup>. In general, there is a wide range of factors that affect an individual's psychological state.

According to the Slovak National Health Information Center, the rate of completed suicides in 2020 was 489, the number of suicides and attempted suicides during last 5 years is declining. The most frequent methods of suicides in Slovakia are hanging and jumps/falls from height, while suicidal electrocutions do not represent preferable suicidal *modus operandi*. The number of attempted suicides by electrocution has not exceeded the limit of 1% of suicides per year in last 10 years<sup>11,7</sup>.

Despite suicidal electrocution is rare method, there are some typical characteristics of this kind of self-destruction documented in literature. Individuals committing suicide via direct connection to an electrical outlet are in majority of cases middle-aged male adults<sup>6</sup>. Study conducted in Bulgaria even identified male-to-female ratio 7:1<sup>6</sup>. Direct attachment to an electrical outlet is more common than dropping an electrical appliance into bathtub or pool<sup>2</sup>. In cases of direct contact with electrical outlet in suicidal intent, wires or leads are typically attached to the extremities<sup>8</sup>, occasionally elsewhere<sup>2,8</sup>. For instance, where there is some electrical circuit included, the deceased usually has some level of technical knowledge about electricity and might be professionally an electrician or engineer<sup>2</sup>. Afterwards, suicidal electrocution is defined as occupation-related suicide<sup>3</sup>, as we described in our case. His occupation must have prompted him to use such method of committing suicide.

Statistics also show that incidence of fatal electrocution is highest in summer months (from June to September)<sup>6,8</sup> which is in accordance with the relationship between duration of sunshine hours and suicide rate<sup>10</sup>. Increased incidence of fatal electrocution in summer months might be in connection with outdoor leisure time or work-related activities, e. g. gardening or swimming. Another theory suggests decreased skin resistance due to increased sweating<sup>9</sup>.

Rare incidence of suicidal electrocution may be surprising due to its universal availability in almost every household nowadays and basic level of electricity knowledge. There are some possible

explanations of this phenomenon. One of them might be an unpleasant sensoric experience in past (e. g. painful shock or view of electrified body). Another explanation may be that electrocution is linked to notorious electric chair in public opinion<sup>2</sup>.

Suicidal electrocutions may be divided in two distinctive groups: in the first group, suicides occur opportunistically by a simplistic contact of the body with the electric current; in this case, there are usually no complicated electronic circuits involved. By contrast, the second group comprises individuals with certain professional background and technical knowledge who may even construct sophisticated electrical traps and use specific electrical gadgets. In such cases, the usage of specific appliances (e.g., timers) or methods for electric effect amplification such as shaving hair in electrocuted region, moistening the skin underneath the electrode are not unusual<sup>14</sup>. The incorporation of the timer into the electronic circuit might also have another explanation - it can be used as a protective mechanism against the injury of individual discovering the body<sup>2</sup>. As the bodies might be electrically active after death, interdisciplinary approach is indispensable, especially examination of the crime scene by electrical professional<sup>14</sup>.

The use of the time switch in presented case suggest some level of knowledge and technical background of deceased. Sometimes schematic drawings or notes about circuit<sup>1</sup> may be found at the crime scene.

In forensic medicine, deaths due to electrocution constitutes a specific chapter. Deaths due to the passage of the electric current might not be always recognized in *postmortem* examination<sup>3</sup>. On external examination, entry marks might be easily overlooked or misinterpreted; in addition, autopsy findings resulting from electrocution are rather non-specific<sup>7</sup>. When goodbye note or letter cannot be found at the crime scene, third party involvement should not be excluded. Usage of electricity to kill an individual can be a sophisticated method of murder.

This case report describes typical suicidal electrocution. Old pensioner suffering from deteriorating health, who worked in the past as an electrician. Due to his knowledge, he was able to construct simple electrical circuit with a switch

to complete suicide. The body was found with a goodbye letter nearby him.

## Conclusion

Death caused by suicidal electrocution are rare in forensic practice. Their rarity and uncharacteristic autopsy findings lead in many cases to difficult determination of diagnosis, occasionally only *per exclusionem*. The cooperation with technical experts at the crime scene is essential for the investigation. Their technical experience/knowledge helps to solve the case correctly. Also, the circumstances and information from relatives can assist to narrow the options. In time of pandemic COVID-19 and outbreak of war in Ukraine, increased psychological care for people in social services homes is important to prevent suicidal thoughts.

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