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FORENSIC, CLINICAL AND SOCIAL ASPECTS IN A CASE OF A CHILD THAT SURVIVED AN ELECTRICAL TRAUMA

Atanas Christov, Teodora Kiryakova, Dimitar Nikolov, Biliana Mileva, Alexander Alexandrov

Department of Forensic medicine and deontology, Medical faculty - Medical University – Sofia

Corresponding author:

Atanas N. Christov, MD,

Medical University, Sofia-1431, Bulgaria

Department of Forensic Medicine and Deontology

2 Zdrave str.

Tel: +359+29230749

Fax: +359+29230412

E-mail: iamnasko@yahoo.com

ABSTRACT

Introduction: We present a case of a 10 year old child who has experienced electrical trauma while playing and climbing on wagons in an unguarded railway depot. After being struck by the electric arc the child was taken to the emergency. Four surgical interventions for auto-transplantation of skin were carried out for one whole month.Materials and methods: In the forensic examination and in the medical documentation, presented 3 months after the incident, we observed that there were extensive scars with the appearance of keloid on both legs and the right gluteal area. In addition there were scars on the left hand, extensive ones on both legs and the back from medical manipulations performed for auto-transplantation of skin tissue. The electrical burning affected 22% of his body, and the burnings were II and III degrees. Discussion: The scars on both legs provided a forensic conclusion that the electric arc has passed through the two lower limbs without damaging any internal organs. Furthermore, during the forensic examination, extensive scars to the degree of keloid were identified where skin has been removed for auto-transplantation. Conclusion: In social and life aspects, we consider that children should be made aware of the danger of approaching high-voltage cables, as well as there should be strict regulations and control on who enters railway depots.

Key words: *electricity, electric arc, shock, burns, auto-transplantation, donation, prevention.*

INTRODUCTION: An electric arc is formed between objects of different electrical potential, which may not be in direct contact with each other. The temperature of the electric arc can reach 2500-5000C and leads to deep burns, both on the skin and the subcutaneous tissue, musculature, and sometimes the internal organs and bone structures. High-voltage damage can cause both heat and flame burns. Fibrillation of the heart may result in damage from higher voltage currents. The effects of electrical current on the body may lead to polyorgan deficiency, cardiac arrhythmias, seizures and long-term injuries (neurological symptoms, psychiatric disorders, epilepsy, etc.). Heart disorders, muscle paralysis of the chest, paralysis of the respiratory and cardiovascular centers in the brain may occur, with sudden heart arrest and stopping of breathing. When an electric arc acts on the body, burning of the skin can be followed by significantly greater damage to the underlying tissue as the electrical current passes from an object with a higher to a lower resistance (for example, from skin to soft tissue), causing lesions from the point of entry to the ground. Significant muscle damage can lead to severe rhabdomyolysis and subsequent renal failure. In such cases, urgent treatment and patient stabilization is needed, as well as treatment of necrotic burns, auto- or allotransplantation of the skin and prolonged care of specialists from various fields of medicine related to the curative and regenerative process (both acute and the restoration phase of the treatment) in order to avoid infection of the affected areas, as well as preventing contractions, limb amputation and other possible complications.

PRESENTATION OF THE CLINICAL CASE: We represent a case of a 10 year old child

who has experienced electrical trauma - an electric (voltaic) arc while playing and climbing on wagons in an unsafe railway depot. After he was struck by an electrical arc, his clothes were lit, and he fell off the wagon. After the fall he called her parents. They quickly went to the scene and transported him to a hospital for emergency care.
Four surgical interventions of autotransplantation of skin, taken from healthy skin areas, were performed at the hospital for the period of one month (Figures № 1 and 2).

Figure 1

Figure 2

During the forensic examination of the child and in the presented medical documentation three months after the incident, we observed large scars with the appearance of keloid on both legs and the right gluteal area (Figures № 3, 4, 5, 6 and 7), scars on the left arm, extensive scars on both legs and the back from the medical manipulations performed for autotransplantation of skin tissue (Figures № 1, 2, 3 and 8); condition after electrical burn on 22% II and III degrees of the left hand side of the abdomen and of both lower extremities, as well as shock.

Figure 3

Figure 4

The two-legged coarse scars (Figures № 3, 4, 5, 6 and 7) provide a forensic conclusion that the electric arc has passed through the two lower limbs and because of the extremely high temperature of the electric arc necrosis of the superficial layer of the skin had occurred. The necrotic tissue acted as an isolator and did not allow the electrical current to affect the vital internal organs and prevented the occurrence of sudden death, as well as damage to the underlying musculature that could lead to rhabdomyolysis and renal failure.

Figure 5

Figure 6

Figure 7

Figure 8

DISCUSSION AND CONCLUSION:

From the forensic point of view, these injuries are the result of the thermal action of an electric current and, in terms of their volume and characteristics, they are well suited to have been obtained by passing of the electric (voltaic) arc through the body of the child, with some of the burns being obtained subsequently due to the burning his clothes.

The volume and severity of the burns would inevitably lead to a fatal outcome if there were no prompt, high-qualified medical actions, involving multiple surgeries and intensive medical care. This allowed us to make the conclusion that in the present case there was a PERMANENT GENERAL DISTURBANCE OF HEALTH THAT ENDANGERED THE LIFE of the child (a medical-biological feature according to the Criminal Code of the Republic of Bulgaria that belongs to the severe bodily injury).

The thermal shock due to its medical and biological characteristics has led to a TEMPORARILY HEALTH DISTURBANCE DANGEROUS FOR LIFE, which is again a medical-biological feature according to the Criminal Code of the Republic of Bulgaria, but it belongs to the medium type of bodily injury.

The identified multiple ridges, covering an extremely large body surface presented as keloid spots, are extremely detrimental to the appearance of the body and, due to their medical and biological characteristics, represent a DISFIGUREMENT, a medical-biological feature

according to the Criminal Code of the Republic of Bulgaria, that also belongs to the medium type of bodily injury.

From a forensic and clinical point of view, it is necessary to monitor the healing process of the lower right limb over time since such a large amount of keloid rust may lead to somatic and psychiatric complications such as contractions with disturbance of the movement of the limb, as well as circulatory, sensory disorders, mental disorders, etc. that require additional treatment and evaluation of the bodily harm.

From a clinical point of view, we believe that in patients with such volume of severe burns, there should be considered the possibility skin to be taken not only from the injured patient but from deceased donors as well, to prevent the risk of additional complications.

In social and life aspects, we think that measures should be taken on one hand by the services that guard potentially dangerous places and sites endangering the life and health of people, and on the other - educational measures for children and the whole population should be performed, explaining the dangers in approaching high-voltage sources.

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