

CASE REPORT

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Oral electric injury in a child as a result of a home accident

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Abstract

Exposure to electricity may have results ranging from a mild injury to severe cardiopulmonary arrest in children. As children are restless and in search of new things, they are generally injured by contacting with low-voltage domestic electrical cords, sockets, and tool. Oral burns are often seen in crawling infants taking a live cable into their mouth. In literature, only a limited number of cases are reported regarding oral commissure injuries associated with low-voltage electric shocks. In this study, we presented a case, which is limited in literature, of one-year-old boy brought to our emergency department upon oral commissure injury as a result of the contact with low-voltage electricity in home accident.

Keywords: Children, Oral burns, low-voltage domestic electrical injury, emergency department

Introduction

Electrical injuries can be classified as low-voltage (<1000 V), high-voltage (> 1000 V), lightning strike, and electric-arc injuries [1]. Exposure to electricity may have results ranging from a mild injury to severe cardiopulmonary arrest in children. Although high-voltage electrical causes high morbidity and mortality, low-voltage exposures are more common in children. Additionally, although household electricity is of low-voltage, it may be cause severe injuries and may have even disabling or fatal effects. As children are restless and in search of new things, they are generally injured by contacting with low-voltage domestic electrical cords, sockets, and tools [2]. There are only a few published studies related to electrical injuries associated with low-voltage. Oral burns are often seen in crawling infants taking a live cable into their mouth. Perioral burns may be either partial or full thickness, either of which can cause perioral muscle injury. Because of scar contracture and potential risk of asymmetry in the mouth, early treatment should be provided. Early splint therapy and late reconstructive surgery may be recommended in this patients. In literature, only a limited number of cases are reported regarding oral commissure injuries associated with low-voltage electric shocks [3]. In our case a 1-year-old boy was injured upon taking

an electric cable into his mouth while playing in the kitchen. In this study, we presented a case, which is limited in literature, of one-year-old boy brought to our emergency department upon oral commissure injury as a result of the contact with low-voltage electricity in home accident.

Case Report

One-year-old male patient was brought to our emergency department by his parents upon an exposure to household electricity. The family stated that the child crawled to the kitchen without their knowledge and was injured upon chewing the cable of an electrical household appliance. Running to the kitchen upon his crying, parents reported that they saw their child was exposed to electricity upon contacting an electrical socket by a metal object. They explained that the child was unconscious for a short time, and when they noticed the wound on the side of his mouth, they took the child to the emergency department of our hospital. The mother was expressed she had cesarean delivery with a normal height, weight and head circumference after a normal pregnancy period. In the physical examination, the child showed normal physical parameters compatible with a one-year-old. The general condition was good, the child was conscious, and his Glasgow coma scale (GCS) was found to be 15. There was a 3x2 cm wide burn injury on the right side of the mouth (Figure 1). The injury was limited with the skin and the subcutaneous soft tissue. There was no damage in the palate, jaw, or tongue. No other injury was found in other parts of the body. The patient was monitored, and an

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electrocardiogram (ECG) was taken. In the ECG, no abnormality was identified in the routine biochemical parameters. The troponin I value received one hour later was normal. Urinating was normal and no haematuria was found. The patient was given fluid treatment, local wound care, prophylactic systemic antibiotherapy, and he received a tetanus shot. ECG, monitoring of vital findings, and blood tests were made, and the patient was followed up for 24 hours in our clinic. Not developing a complication, the patient was discharged from the emergency department.



Figure 1. Elektrical injury on the right side of the mouth

Discussion

While electricity injuries occur in work environments or outside in the case of adults, such injuries frequently happen at home as a result of parent negligence in the case of children. Injuries of children associated low-voltage electricity at home account for 3-9% of the burn cases admitted to general centres for burns [4].

Although the area of damage is very limited in electrical injuries unlike other burn types, a significant damage on muscles, the skeletal system, the central nervous system, and the kidney might remain latent. The fact that children have less subcutaneous and general body fat renders them less resistant against electrical injuries. Nevertheless, the severity of injury depends on such factors as the resistance of the involved tissues, electricity voltage type, and duration of contact.

Oral electrical burn is a type of electrical injury observed in 6 to 35 month old children [4]. Children are subjected to electrical injuries generally as a result of parent negligence or lack of sufficient attention. Low-voltage household electrical injuries take place due to worn or stripped electrical cables, broken domestic appliances, contacting electric sockets with a metal object, or a breakdown in the domestic electrical installation. Many of these injuries occur in the oral commissure and the adjacent joint of the upper and lower lips [5]. The local sequelae in these children mostly include trauma-associated muscle necrosis and perioral complications. Oral burns might impair oral movements and also affect the nourishment of a child [3]. A burn had occurred in the right oral commissure of our case when he crawled to the kitchen and took the cable with an

exposed piece of metal on its edge into his mouth.

The impacts of an electrical current on the body depend on its amperage, voltage, and frequency as well as the area of body contact and tissue resistance. Such injuries might affect cardiopulmonary, muscular, and nerve systems, intra-abdominal solid organs, and the skin in variable extents [6].

Clinical data published relating to electrical burns in children are insufficient. Additionally, there is no guideline or a randomised, controlled study published for the treatment of these children. In the first application to the emergency department, basic life support should be provided for a child, if needed. Taking a proper medical history of those children with an electrical injury who are conscious and cooperative is important for the monitoring and treatment of the patient. Knowing the specific voltage that injured the patient will help the management of the patient in the emergency department as well [7]. Then the patient should be monitored, and regular checks must be made related to the state of consciousness, electrolyte, cardiac enzyme, ECG, oxygen saturation, blood pressure, pulse, and urine outflow.

In emergency departments, fluid treatment for electrical injuries is vital. We might be mistaken when calculating the need of fluid depending on the area of burn in electrical injuries. Therefore, the fluid required should be provided by considering the related clinical and laboratory findings such as blood pressure and urinating. If there is a possibly contaminated or infected wound, antibiotherapy must be included in the treatment. Tetanus vaccination is made if needed depending on the date of vaccination. In our case, the estimated rate of burn was around 1%; the fluid treatment was maintained in consideration of his physiological findings such as blood pressure and urine outflow. Because his tetanus vaccination status was not known, he was vaccinated.

An electrical shock might lead to death or disability by impacting the central nerve system. It can also cause various neurological deficits such as blindness, deafness, dysmnnesia, and paralysis. In our previous study, 9 out of the 36 children who had been exposed to low-voltage electricity injuries were not conscious when they were admitted to the emergency department [2]. In this case, the subject was conscious in his admittance to the emergency department but a short period of fainting in the kitchen where the incidence took place was stated by his parents.

Cardiac arrhythmia monitoring of children exposed to electrical injuries associated with low-voltage is controversial. Many authors reported that increases of cardiac enzymes such as CK-MB and troponin I, and late complications such as cardiacarrhythmia could occur in children exposed to low-voltage electricity injuries [2,8]. A 24-hour follow-up is suggested for such children [8]. However, some other authors reported that cardiac arrhythmia almost never developed in these patients and therefore, a 24 hour monitoring was not needed [9,10].

Complications such as electrolyte imbalance and sepsis can also develop in injuries associated with low-voltage. Especially those children who are followed up in intensive care and burn units are at potential risk [2]. In our case, the extent of burn was not much, and his vital findings were stable from the admittance, and no life-threatening complication developed in the 24-hour follow-

up. Taking preventive measures is much more important than the treatment after an actual injury in the case of these children. Although low-voltage household electrical injuries appear to be few in number, we believe that this is due to the insufficient records.

This case presentation study involves a significant limitation factor. Our subject never returned to the hospital although plastic and reconstructive surgical outpatient clinic control was suggested during the discharge. Therefore, the records of any subsequent medical information of the subject could not be reached.

Conclusion

As a conclusion, injuries of children by household electricity are mostly caused by parent negligence. Injuries associated with low-voltage household electricity can sometimes lead to life-threatening results. Based on our previous experiences, we suggest a 24-hour follow-up for these children even if their vital findings are stable during their admittance to the emergency department.

Competing interests

The authors declare that they have no competing interest

Financial Disclosure

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References

1. Maghsoudi H, Adyani Y, Ahmadian N. Electrical and light-ning injuries. *J Burn Care Res.* 2007;28:255-61.
2. Gokdemir MT, Kaya H, Sogut O, et al. Factors affecting the clinical outcome of low-voltage electrical injuries in children. *Pediatr Emerg Care.* 2013;29:357-9.
3. Kung TA, Gosain AK. Pediatric facial burns. *J Craniofac Surg.* 2008;19:951-9.
4. Toon MH, Maybauer DM, Arceneaux LL et al. Children with burn injuries-assessment of trauma, neglect, violence and abuse. *J Inj Violence Res.* 2011;3:98-110.
5. Yeroshalmi F, Sidoti EJ, Adamo AK, et al. electrical burns in children -a model of multidisciplinary care :case report. *J Burn Care Res* 2011;32:25-30.
6. Peyron PA, Cathala P, Vannucci C, et al. Wrist fracture in a 6-year-old girl after an accidental electric shock at low voltages. *Int J Legal Med.* 2015;129:297-300.
7. Arnoldo BD, Purdue GF. The diagnosis and management of electrical injuries. *Hand Clin.* 2009;25:469-79.
8. Browne BJ, Gaasch WR. Electrical injuries and lighting. *Emerg Med Clin North Am.* 1992;10:211-29.
9. Lee JW, Jang YC, Oh SJ. Paediatric electrical burn: outlet injury caused by steel chopstick misuse. *Burns.* 2004;30:244-7.
10. Bailey B, Gaudreault P, Thivierge RL, et al. Cardiac monitoring of children with household electrical injuries. *Ann Emerg Med.* 1995;25:612-7.