



Chemical Burn Injury in the Scrotal Area Caused by Button Cell Battery: A Case Report

Mohammad Reza Rezaeimehr¹, Mahtab Zargham², Erfaneh Yaali-Jahromi³, Atefeh Yaali-Jahromi⁴ and Mohammad Heiat^{5,*}

¹Shiraz Nephro-Urology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

²Isfahan Kidney Transplantation Research Center, Department of Urology, AL-Zahra Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

³Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran

⁴Jahrom University of Medical Sciences, Jahrom, Iran

⁵Baqiyatallah Research Center for Gastroenterology and Liver Diseases, Baqiyatallah University of Medical Sciences, Tehran, Iran

*Corresponding author: Baqiyatallah Research Center for Gastroenterology and Liver Diseases, Baqiyatallah University of Medical Sciences, Tehran, Iran. Tel/Fax: +98-2182482260, Email: mohamad.heiat@gmail.com

Received 2020 June 11; Accepted 2020 July 23.

Abstract

Here we reported a one-year-old infant with tissue damage in the scrotum area, in which a small button cell battery had been found in his diaper. Evidence suggested that the lesion was caused by contact with the leaky battery with the scrotal skin. The treatment procedure was prescribed by a dermatologist. The healing process was tracked over the examination times. After two months, the site of the lesion showed complete remission. The findings suggested that in such cases, after removing the chemical agent, blisters, and necrotic tissues, therapeutic measures should be performed similarly to the thermal burns.

Keywords: Chemical Burn, Battery, Scrotum, Infant

1. Introduction

Chemical burns contain a small percentage of all burns (10.7%), but constitute nearly one-third of all burns-related deaths (1). Today caustic chemicals can be found in many household and industrial products, which its damage spectrum ranges from surface damage to life-threatening injuries. The burns caused by these agents, especially in children, are rising. Most chemical-related deaths are due to the ingestion of chemical substances (2, 3). Batteries are the most available source of such caustic chemicals. Nowadays, batteries are commonly used in electronic toys and domestic instruments (4). The compounds in batteries can create thermal reactions that lead to severe damage and the burning of adjacent tissues (5). This report examined a case of a one-year-old child with tissue damage caused by skin contact with a leaky button cell battery in the scrotum area.

2. Case Presentation

2.1. Case Referral and Narrative Statements

The patient is a one-year-old infant, without a history of hospitalization or underlying disease, which a small button cell battery was found in his diaper. The last time of re-

placing the diaper had been about 10 hours before the battery was seen. According to the parents' statements, a battery used in the laser toy, possibly entered into the diaper while playing, then located on the surface of the scrotum and causing skin lesions in the area.

2.2. Illustrated Evidence and Early Diagnosis

Given the picture provided by the parents about the battery found in the diaper, there was some leakage (battery leakage) around the battery. Considering the battery images (Figure 1A), an alkaline button battery (model; LR44) with 11.4 mm (0.45 in) in diameter, which produces 1.5 volts, was the cause of the complication. At the primary state of diagnosis, a necrotic wound with dimensions of 1.5 × 1.5 cm was proved through an examination by a dermatologist counselor. The wound was completely rounded edges and located at the center of the scrotum (Figure 1B). No sign of infection was not found around the lesion. The lesion was dry and did not have any discharge.

2.3. Ultrasound Findings

Ultrasound was performed from the scrotal area to investigate the conditions of the testicles and measuring the severity and the depth of the damage. Based on the ultrasound report, the scrotal thickness at the lesion area was

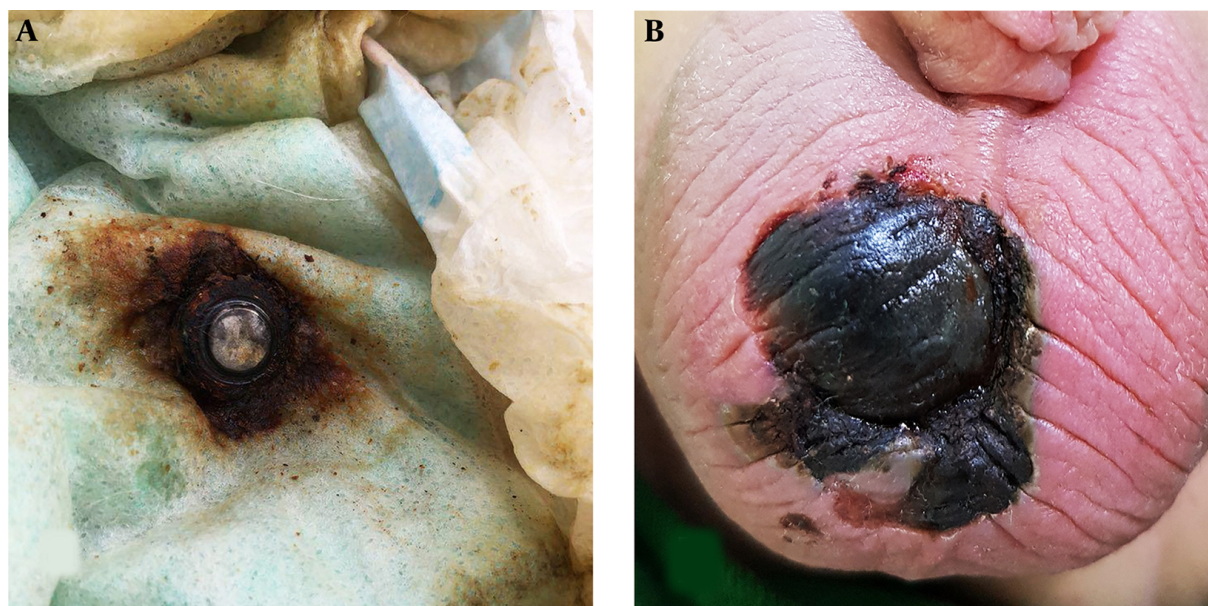


Figure 1. Pictures provided by the parents. A, Battery and its leakage in baby diaper; B, the rounded wound at the center of the scrotum

increased up to 18 mm on the left and 17 mm to the right. The edema and inflammation were also observed in the scrotum area. In the site of the lesion, the edema was more intense, and a linear echogenic region was seen due to the gas focus. However, no evidence of gangrene was observed. Both testicles and epididymis were normal, and no hydrocele was seen.

2.4. Treatment Procedure and Follow-Up

According to the prescription given by a dermatologist, the following treatment procedure was administered. Mupirocin ointment; every 8 hours, Cicalfate Avène cleanser; twice a day, Fibrinolysin ointment (elastic ointment); 2-3 times daily and a wet-dry compress; three times a day to remove dead tissue from the site of the lesion.

No lab test or intervention was performed on the patient. The patient was discharged with parental consent after a few hours of admission to the emergency room. The patient did not have any referral in person after discharge and was virtually linked to the doctor by sending photos. Short-term follow up using a series of photos over interval times revealed that after a week, an eschar tissue was created at the burned site (Figure 2B), and after one month, a healed skin with no wound symptoms was formed in the site (Figure 2D).

3. Discussion and Conclusions

Chemical burns are generally divided into two groups of acidic and alkaline burns (6, 7). Acids with a pH lower

than 2 cause coagulative necrosis on the skin. On the contrary, alkaline agents with a pH higher than 11.5 can cause severe skin damage by creating liquefactive necrosis that causes saponification of lipids and denaturation of proteins. So the burns caused by the alkaline agents are expected to be much more severe than the acid. Chemical burns in children account for low frequent burns. In a study by Hardwicke et al., only 1.1% (24 out of 2054) of the burns examined during an eight years period were chemical burns in children (under 16), and only two cases were caused by the battery (6). Studies reported that lithium and alkaline batteries can cause more severe damages than other types of batteries (5). Batteries that do not leak can also cause damage by creating local electrical current in the tissue, hydroxyl accumulation, and regional hydrolysis. In 2005, it was reported that a 32.2 mm manganese battery (alkaline battery) was entered into the vagina of a 12-year-old girl and was remained there for 3 days. Although the battery did not leak, but a wound was seen in the vaginal wall, which was adjacent to the positive and negative poles of the battery (8). Foreign body ingestion, such as battery ingestion, also commonly occurs in children. Battery ingestion can lead to some complications, such as severe internal bleeding, aortophagal fistula, bilateral vocal cord paralysis, heavy metals toxicity, fever, nausea, bloody stool, loss of appetite, abdominal pain, and severe vomiting (5, 9-11). In the case discussed in this report, the lack of clinical signs such as abdominal pain, severe cough, diarrhea, severe nausea, and vomiting, as well as the lack of

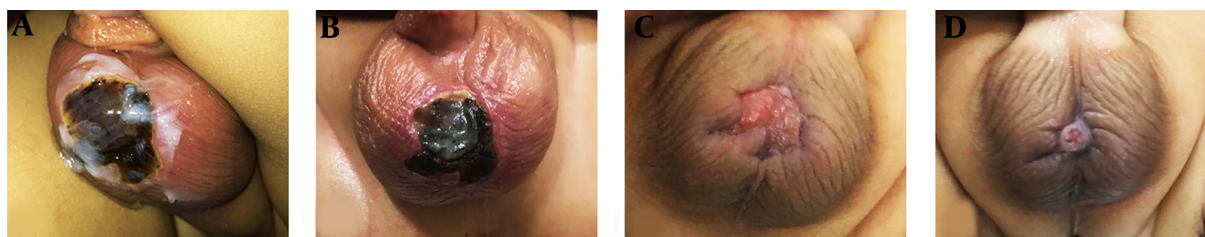


Figure 2. Images of the site of the lesion after A, two days; B, one week; C, two weeks; and D, one month after the start of treatment. As the pictures clearly show, the patient has passed a recovery process and no wound symptoms are observed in the site after one month of treatment initiation.

changes in the digestive status of the patient and the absence of feces and diarrhea around the battery in baby's diaper (Figure 1A), rejected the possibility of battery ingestion. Therefore through a rational argument, the battery accidentally has dropped in the diaper while the infant was playing with a laser light toy. Subsequently, the proximity of alkaline leaky battery to scrotum caused such damage to the infant. Chemical burn of the scrotum with the battery leakage may lead to complications such as congestive necrosis in the testicles, infection, and abscess, or even sepsis. In such cases, the probability of testicular damages is very high. However, given that the diaper of infants should frequently be changed, the causative agent does not remain in contact with the skin for a long time; the depth and severity of burning are slight. Accordingly, in such cases, like thermal burns, local treatment procedures will be effective. However, more deep studies with more important details are needed to complete a comprehensive concept around chemical burn injury in the scrotal area.

Acknowledgments

The authors would like to express their deepest gratitude to all colleagues in the Isfahan department of urology for their kind scientific supports. The authors also thank Dr. Mohammadi because of his favors in some steps of this report.

Footnotes

Authors' Contribution: Mohammad Reza Rezaeimehr did project development and data Collection. Mahtab Zarghamdid protocol and project development. Erfaneh Yaali-Jahromi did manuscript writing and editing. Atefeh Yaali-Jahromi did manuscript writing and editing. Mohammad Heiat did data collection and management of manuscript writing.

Conflict of Interests: The authors declare no conflict of interest.

Ethical Approval: All procedures performed in the current study involving human participants were in accordance with the ethical standards of the institutional and with the 1964 Helsinki Declaration.

Funding/Support: There is no funding or support for our study.

Informed Consent: Informed consent was obtained from parents.

References

- Wang CY, Su MJ, Chen HC, Ou SY, Liu KW, Hsiao HT. Going deep into chemical burns. *Ann Acad Med Singap.* 1992;**21**(5):677-81. [PubMed: 1292400].
- Gnanaswaran N, Perera E, Perera M, Sawhney R. Cutaneous chemical burns: Assessment and early management. *Australian Fam Physicians.* 2015;**44**(3):135.
- Hardwicke J, Hunter T, Staruch R, Moiemien N. Chemical burns—an historical comparison and review of the literature. *Burns.* 2012;**38**(3):383-7. doi: 10.1016/j.burns.2011.09.014. [PubMed: 22037150].
- Khundkar R, Malic C, Estela C. Burned by a battery-coin short circuit: old concept for a new burn. *Burns.* 2010;**36**(1):e4-5. doi: 10.1016/j.burns.2008.11.018. [PubMed: 19304398].
- Eliason MJ, Ricca RL, Gallagher TQ. Button battery ingestion in children. *Curr Opin Otolaryngol Head Neck Surg.* 2017;**25**(6):520-6. doi: 10.1097/MOO.0000000000000410. [PubMed: 28858893].
- Hardwicke J, Bechar J, Bella H, Moiemien N. Cutaneous chemical burns in children - a comparative study. *Burns.* 2013;**39**(8):1626-30. doi: 10.1016/j.burns.2013.04.005. [PubMed: 23768715].
- Alemayehu H, Tarkowski A, Dehmer JJ, Kays DW, St Peter SD, Islam S. Management of electrical and chemical burns in children. *J Surg Res.* 2014;**190**(1):210-3. doi: 10.1016/j.jss.2014.03.009. [PubMed: 24698499].
- Yanoh K, Yonemura Y. Severe vaginal ulcerations secondary to insertion of an alkaline battery. *J Trauma.* 2005;**58**(2):410-2. doi: 10.1097/01.ta.0000068993.90723.46. [PubMed: 15706216].
- Honda S, Shinkai M, Usui Y, Hirata Y, Kitagawa N, Take H, et al. Severe gastric damage caused by button battery ingestion in a 3-month-old infant. *J Pediatr Surg.* 2010;**45**(9):e23-6. doi: 10.1016/j.jpedsurg.2010.06.002. [PubMed: 20850612].
- David TJ, Ferguson AP. Management of children who have swallowed button batteries. *Arch Dis Child.* 1986;**61**(4):321-2. doi: 10.1136/adc.61.4.321. [PubMed: 3707180]. [PubMed Central: PMC177742].
- Palao R, Monge I, Ruiz M, Barret JP. Chemical burns: Pathophysiology and treatment. *Burns.* 2010;**36**(3):295-304. doi: 10.1016/j.burns.2009.07.009. [PubMed: 19864073].