



Visual Case Discussion

Caustic burn after spontaneous explosion of lithium ion battery

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A previously healthy 40-year-old man presented to the emergency department (ED) with a burn to his right thigh after two lithium ion batteries exploded in his pocket on his way to work. He is a former cigarette smoker who started “vaping” to quit smoking and was carrying spare e-cigarette lithium batteries in his pocket. He stated that the explosion occurred after he placed keys in his pocket, and he immediately removed his pants after the incident. The patient also denied any medical history as well as any medication, illicit drug, or alcohol use. In the ED, the wound was irrigated with sterile water. The burn on his right thigh was approximately 9% of his body surface area and consisted of superficial and deep partial-thickness burns. Motor function of the leg was preserved, however there was loss of sensation at the location of the deep burn. The patient was given a tetanus vaccination update, treated with pain medication and transferred to a burn center (Figs. 1–3).



Fig. 1. Upper right thigh.

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Fig. 2. Middle right thigh.



Fig. 3. Pant pocket after burn.

References

1. Treitl D, Solomon R, Davare DL, et al. Full and partial thickness burns from spontaneous combustion of e-cigarette lithium-ion batteries with review of literature. *J Emerg Med.* 2017;53(1):121–125.
2. Maraqa T, Mohamed MAT, Salib M, et al. Too hot for your pocket! Burns from e-cigarette lithium battery explosions: a case series. *J Burn Care Research.* 2018;39(6):1043–1047.
3. Kite AC, Le BQ, Cumpston KL, et al. Blast injuries caused by vape devices. *Ann Plast Surg.* 2016;77(6):620–622.

Questions

1. What is an immediate necessary step when addressing chemical burn injuries as opposed to other types of burn injuries?
 - a. Giving IV fluids based on body surface calculations and urine output
 - b. Checking for the pH of the wound prior to irrigation
 - c. Performing an immediate skin graft and debridement of necrotic tissue
 - d. Starting topical antibiotics
2. Which of the following is a possible consequence of burn related injuries?
 - a. Hypovolemia due to fluid shifts
 - b. Sepsis due infected tissue
 - c. Neuropathy due to burn related nerve damage
 - d. All of the above

Answers

1. Checking for the pH of the wound prior to irrigation. Chemical burn injuries are unique due to the fact that it can have a sustained thermal reaction even after initial exposure. Therefore, it is extremely important to remove and source of the chemical burn from the body as soon as possible. In addition, it is important to perform a litmus paper pH test because alkali burn injuries (pH of 9 and above) can cause further exothermic reactions when reacted with water. All of the other options are standard procedure when addressing burn injuries as it is important to aggressively hydrate the patient before they experience clinical hypovolemia, in addition to starting antibiotic prophylaxis. Finally, skin grafts and debridements are not performed during the acute phase of burn treatment.^{1,3}
2. All of the above. All of the options are correct. Due to inflammation from the burn injuries, there is significant effects fluid shifts which overall lead to decreased intravascular volume. Furthermore, sepsis is a possibility because the exposed burn areas are extremely susceptible to infection and therefore topical antibiotics should be used, with consideration for systemic antibiotics. Finally, severe burn injuries have the potential to cause peripheral neuropathy if the burn is deep enough.²

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.visj.2019.100615](https://doi.org/10.1016/j.visj.2019.100615).