ENZYMATIC DEBRIDEMENT AFTER MOBILE PHONE EXPLOSION: A CASE REPORT

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SUMMARY. It is estimated that over 90% of people own a mobile phone. Although rare, lithium-ion battery explosions can cause varying degrees of thermal burn injury. Recently, selective enzymatic debridement has gained importance in the management of burn patients, thanks to its simplicity, minimum invasiveness and safety. In this work, we describe a case of a burn injury caused by the explosion of a lithium-ion battery and treated with selective enzymatic debridement in a paediatric patient.

Keywords: burn, thermal injury, mobile phone, lithium battery, Nexobrid®, selective enzymatic debridement

Case report

A fourteen-year-old male patient was admitted to our Plastic and Reconstructive Surgery Department after the original lithium-ion battery in his mobile phone accidentally exploded (Fig. 1). The explosion occurred while the device was in his trouser pocket, not charging and in standby mode. The lesion covered an area of 35 x 15 cm of the right thigh (6% TBSA). After cleansing and blister removal, a 6 x 8 cm full thickness third degree burn was identified in the central region, a deep second degree burn in the upper part, and superficial second degree burn in the remaining areas (Fig. 2). The lesion has the appearance of a thermal burn.

Following standard protocol, enzymatic gel was applied three hours after the thermal injury for four hours. After the trousers were removed, a “wet to dry” dressing was left in place for two hours. The procedure was carried out at the bed-
Blood loss was minimal and only moderate sedation combined with analgesia was administered. Given the patient’s young age and the type of thermal injury (immediate skin grafts have high complication rates), it was decided to medicate the entire burn with paraffin-based gauze and silver sulfadiazine ointment. The patient was discharged from hospital the following day. In the first two weeks, the dressing was changed three times a week, and in the following three weeks, once every 5 days (Fig. 3). In the meantime, after the first week and on several occasions, we proposed a Split Thickness Skin Graft to speed up healing but the patient refused any surgical treatment so we continued with wound care. Thirty-seven days after we applied enzymatic gel, the wound was completely re-epithelialized (Fig. 4). No infection or side effects were detected and the newly formed skin was pliable and elastic. At 12-month follow up, the scar was evaluated with the Patient Observer Scar Assessment Scale, previously used in a randomized study by our group. PSAS was 40. OSAS was 33.

**Discussion**

We have reported a case of enzymatic debridement after the lithium-ion battery in the mobile phone of a teenage patient exploded. This is a rare event, but it has been reported in the literature before. However, this is the first reported case of mobile phone burns treated with enzymatic debridement. Enzymatic debridement has several advantages, such as simplicity of application, relative low cost and, above all, the ability to differentiate burned tissues and necrotic tissue from viable tissue.

It has been well demonstrated that enzymatic debridement decreases blood loss and avoids the removal of viable and healthy tissue. This reduces both the area of the wound that has to undergo skin grafting and the number of patients that are treated surgically. In our personal experience of using Nexobrid® for enzymatic debridement, we came to the conclusion that it allows a selective and useful discrimination between different grades of burn tissue, facilitating diagnosis. Once debridement is finished, further treatment of the burns can be planned by the surgeon considering the appearance of the burns immediately afterwards. Moreover, enzymatic debridement works well for bed preparation for early skin grafting that, in our opinion, is the best treatment. However, in our case report, enzymatic debridement proved to work egregiously also for chemical thermal injury, allowing the wound to heal completely without any surgical procedure. This feature is useful in patients with age or health issues for whom surgical debridement is not advised. Furthermore, the selectivity and simplicity of the enzymatic method make it possible to treat the burn at the patient’s bedside (TBSA<10% and without comorbidities). Use of this drug is painful during the process and suitable painkiller administration is necessary. This is reported in the literature and was confirmed also in our experience. However, it depends on the patient and on the extent of the burn. The main contraindication is sensitivity to pineapple.
Conclusion

We selectively treated a patient with thermal injury at his bedside with light sedation. We completely removed non-viable tissue from a burn of varying degrees in a paediatric patient involved in an accidental explosion of a mobile phone lithium-ion battery. The result two months after second intention wound healing was optimal and management of the patient gave us no particular issue. The procedure was safe and minimally invasive. We did not observe any side effects. Thus, despite the need for a wider number of cases, we recommend the use of bromelain-enriched proteolytic enzyme debridement also in the management of burns caused by a mobile phone battery exploding.

BIBLIOGRAPHY


Consent. The patient and his parents gave their consent to the use of the images in the paper.

Conflict of interest. The authors have no conflict of interest to report.