E-cigarette burns: Management of a growing phenomenon

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Introduction

Since its introduction to the market in 2003 [1], e-cigarette (EC) usage has risen exponentially. This growth has been attributed to heavy promotion through social media channels, low cost, and misbelief that e-cigarettes are safer than their traditional counterparts [2].

EC is a battery powered device which heats up a liquid solution to create vapours in which the user is able to inhale. In order to vapourise the liquid solution, EC will create temperatures from 100-250 degrees celcius. Contents of the liquid solution commonly contain nicotine, flavouring and a solvent (typically glycerin and polyethylin glycol)[3].

Due to the rise in popularity of EC in the past decade, there have been an increasing number of burns presentations due to EC device malfunction [4]. The mechanism of burns from EC are multiple: contact burn from overheating of the lithium battery, flame and/or chemical burn from the exploding lithium battery and e-cigarette liquid[3].

We present a case series of 2 patients that have presented to the Royal North Shore Hospital Burns Unit in 2019 for EC related burns.

Figure 1. Diagram of E-cigarette components

Cases

Case 1

A 64-year old female who presented to our unit following a contact burn to her right posterior thigh from overheating of her EC in her back pocket whilst she was asleep. The resultant burn was full thickness and contributed to 1% total body surface area (TBSA). She had a significant history of COPD. She required a debridement and skin graft which was performed on day 10. On subsequent review, it was found that she had only 50% graft take and with discussion with the patient, a decision was made to manage the remainder of her wound with dressings.

Figure 2.

Case 1 right thigh burn on initial presentation (left) and on graft review on day 6 (right)

Case 2

A 61-year old male who presented to our unit with a 3% TBSA burn (deep dermal/full thickness) to his distal right thigh following an explosion of his EC device. He had a background history of Type 2 Diabetes and sleep apnea. He required a debridement and skin graft which was performed on day 8 post-burn. On subsequent reviews, his skin graft had taken and he was discharged from our service after 2 months.

Discussion

From our 2 cases of EC burns that have presented to our department in 2019, both have required an operation for debridement and skin grafting. The mechanism of burns related to EC use are multiple; contact, flame and chemical. Leeching of elemental lithium and its compounds from the EC battery can result in an alkali chemical burn [5]. The multimodal nature of EC burns may mean that EC burns have a propensity to present as a deeper burn than a traditional contact or chemical burn. This may explain why all of our patients so far have required operative management. According to the National Drug Strategy Household Survey, in the Australian general population aged 18 and over, EC use has doubled from 4.4% to 8.8% between 2013 and 2016 [6]. This growing trend highlights the potential increase in number of burn presentations secondary to EC use in the future.

Conclusion

As EC use is expected to rise, so too will the number of burns presentations secondary to EC device malfunction. As the mechanism of burn is a combination of thermal and chemical, it is important that EC burns be recognised as such and managed accordingly. Based on our case series, it is likely that EC burns will often necessitate surgical management. This may in in part due to the mixed nature of EC burns resulting in a deeper burn depth on presentation.

References

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