


Iatrogenic thermal burn after hot water immersion for weever fish sting treatment: a case report

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Abstract

Introduction: Lesser weever fish are saltwater fish that are found on the Mediterranean and European coasts, over sandy and muddy seabed areas, typically around the summer season. These bottom dwellers have envenoming dorsal spines that sting when stepped on. Severe pain is the main symptom. Initial treatment involves wound irrigation, removal of spines if they are visible and immediate hot water immersion (HWI). Tetanus prophylaxis, leg elevation and analgesia are recommended after pain subsides. HWI treatment is described as immersion of the affected area in hot, but not scalding, water to tolerance (upper limit 45 °C) for 30–90 min or until there is significant pain relief. While HWI is an effective therapy for the pain control of marine envenomation, it presents a potential risk of thermal burn injury in the untrained or unsupervised. Here, we present a case of an iatrogenic thermal burn after HWI for the treatment of a weever fish sting.

Case report: A 16-year-old girl was referred to our outpatient department with a superficial dermal thickness burn to her big toe 12 days after accidental stepping on a lesser weever fish. She reported receiving HWI treatment at the scene of the injury. She was treated with dressing, oral antibiotics and leg elevation. This healed with no sequelae at nine-month follow-up.

Conclusion: Thermal burn injury can occur after HWI treatment. Providers should be aware and diligent while the patient needs to be educated in the potential risks.

Keywords

Weever fish, hot water immersion, thermal burn

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Stings from lesser weever fish occur mostly in the summer months. These bottom dweller saltwater fish are found in the Mediterranean and European coasts, over sandy and muddy seabed areas; it releases venom from its dorsal spine when stepped on. Severe pain is the main symptom. Recommended first aid includes wound irrigation, removal of spines if they are visible and immediate hot water immersion (HWI) treatment. HWI means immersion of the affected part into hot, but not scalding, water (upper limit 45 °C) for 30–90 min or until pain is alleviated. In an ideal situation, the water temperature should be checked with a thermometer. However, in practice, where no thermometer is available, the water must be tested before immersion. It is advised to ensure that the water should be no hotter than the first aider can stand or the highest temperature tolerable by the patient. However, HWI treatment has a potential

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risk of burn injury. Here we describe a case of a 16-year-old patient who sustained burn injury after HWI therapy received after a sting by a weever fish. The patient was treated with dressings and the wound healed without requiring surgical intervention. Here, we like to highlight that although HWI is effective in treating stings from marine animals, both the provider and the patient need to be aware of potential burn injury associated with this treatment.

Background

Weever fish are a species from the Trachinidae family, are found in the Mediterranean and European coastal areas and are among the recognisable causes of marine envenomation. They have spines on their dorsal fins and gill covers that secrete potent venom. The lesser weever fish come into shallow water, found all around the UK and Ireland, over sandy and muddy seabeds. They are bottom dwellers that sting when stepped on and are the species most likely to be encountered by bathers in the summer months.^{1,2}

The initial symptom is severe pain, which can quickly affect the entire extremity, associated with swelling and restricted movement. Although most cases are localised, a broad array of systemic symptoms may accompany envenomation such as pallor, agitation, headache, nausea, vomiting and syncope.³ The venom of weever fish contains several thermo-labile proteins, which may be denatured by heat. Consequently, hot water immersion (HWI) is used as the cornerstone of first aid treatment. This involved immediate HWI of the affected extremity, hot water at 42–45 °C for a period of 30–90 min, or until pain is relieved.⁴ Although this treatment appears to be safe, there is a risk associated with thermal burn. Here, we report a case of superficial dermal burn in a patient treated with HWI for weever fish sting of the foot.

Case report

A 16-year-old patient was referred to our trauma clinic for assessment of a wound in her right foot. Twelve days previously, she sustained a sting from a lesser weever fish while walking barefoot in the sea. She received initial treatment at the scene with what she described as immersion of her right foot into a basin of hot water. She also received a tetanus injection by a local general practitioner. The patient is a non-smoker, fit and healthy but has an allergy to penicillin. She was visiting Ireland for her summer holiday. After one week, the patient presented to the local general hospital as the pain and swelling remained persistent. The wound was cleaned, dressed with AQUACEL (ConvaTec, UK) dressing and she was commenced on oral clindamycin. She remained systematically well.

She was first seen in our unit at 12 days after the injury. Clinical examination revealed a near circumferential superficial dermal burn to the right big toe, malodorous, with intact sensation and capillary refill of 2 seconds. (Figure 1). She was weight bearing with the right heel. A plain film X-ray of the right foot revealed no foreign body. The wound was cleaned and ACTICOAT™ Flex 3 (Smith & Nephew, UK) dressing was applied. The patient was advised to complete a one-week course of antibiotics and continue dressing the treatment as mentioned above as the patient was due to return home in a few days. She continued the conservative dressing treatment locally and the wound had healed with no sequelae at the nine-month follow-up.

Written informed consent for the case to be published (including accompanying images, case history and data) was obtained from the patient.

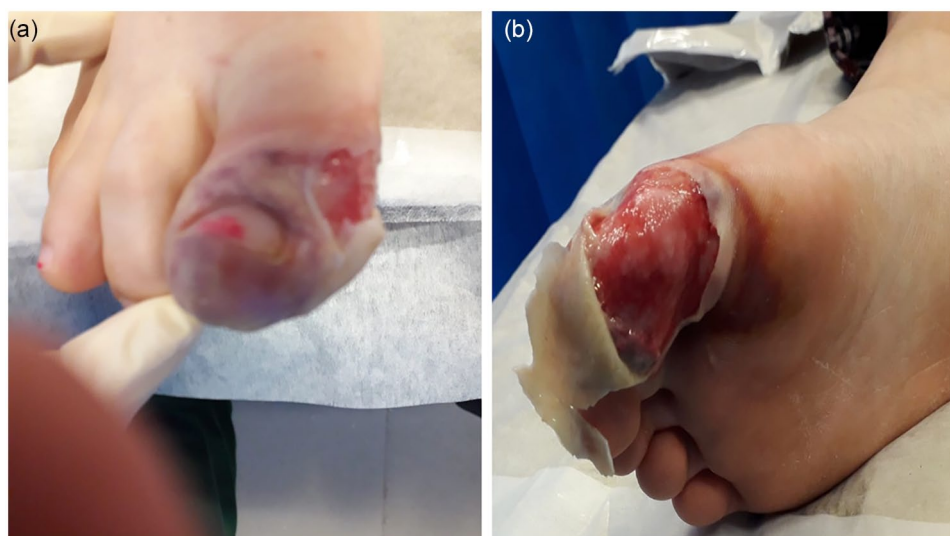
Discussion and conclusions

HWI is not unique to weever fish envenomation. In fact, HWI is a recognised treatment for marine envenomation injuries. Although there is no randomised control trial to support this method of treatment, evidence from case reports and literature reviews that verify its effectiveness has led to the incorporation of HWI in the treatment guidelines. The current recommendation of HWI treatment entails placing the affected area into hot, but not scalding, water (42–45 °C) for 30–90 min or until the pain is relieved. However, in practice (where access to a thermometer for accurate measurement of temperature is not available), it is advised to ensure that the water should be no hotter than the first aider can stand or the highest temperature tolerable by the patient.⁴

We described a case of superficial dermal burn to the foot secondary to HWI for treatment of weever fish sting, resolved with conservative dressing and elevation. When reviewing the literature, we identified further reports of iatrogenic thermal injury from HWI therapy. (Table 1) Lewis et al. reported nine patients who sustained thermal burn ranging from superficial to deep dermal burn due to continued unsupervised HWI at home for ongoing pain relief.⁵ Josiassen et al. reported a case of right index finger sting from greater weever fish in a

Table 1. Literature review results: Cases reporting the use of hot water immersion for marine envenomation with subsequent iatrogenic burn injury.

Reference	Cases (n)	Anatomical area	Burn depth	Treatment	Marine envenomation
This case	1	Foot	Superficial dermal	Dressing	Lesser weever fish
Lewis et al. ⁵	9	Foot	Superficial - deep dermal	8 Dressing 1 Surgery	NA
Josiassen et al. ⁶	1	Upper limb	Second degree	Subsequent partial finger amputation	Greater weever fish
Kizer et al. ⁷	1	Upper limb	Second degree	NA	Scorpaenidae fish

**Figure 1.** (a, b) Image taken 12 days after injury.

54-year-old man who was a non-smoker and had no cardiovascular history, who received HWI as first aid. Unfortunately, this then led to a second-degree burn and subsequent partial amputation of the finger.⁶ In a five-year experience of a poison centre (1979–1983), published by Kizer et al., where 51 cases of Scorpaenidae envenomation were recorded, only one case of second-degree burn was reported.⁷

In conclusion, although HWI is acknowledged as an effective treatment for marine envenomation, it has the potential risk of causing a thermal burn injury. We recommend that the first aid provider be familiar with the recommended temperature, use a thermometer to ascertain water temperature and warn the patient of potential burn injury.

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