WILDERNESS & ENVIRONMENTAL MEDICINE XXX; XXX(XXX): ■–■

Letter to the Editor

Envenomation by Montpellier Snake, *Malpolon monspessulanus* Following Prolonged Bites

To the Editor:

The exact function and possible toxicity of most components of snake venoms have not been fully elucidated.[1] Clinically, the identification of potentially toxic components does not automatically translate into a human health issue. Not all venomous snakes are equal in terms of health risk. For instance, several vipers have little medical significance (eg, *Vipera ursinii ursinii*[2]), whereas some colubrids may inflict life-threatening bites (eg, *Dispholidus typus*[3]). Besides venom composition, the diversity of venom delivery systems (eg, front vs rear fangs), snake body size, and snake behavior all combine to generate a complex picture.[4] It is therefore crucial to examine to what extent snakebites generate clinical symptoms.

The Montpellier snake (*Malpolon monspessulanus*, Psammophiidae) is a large (up to 2 m) rear-fanged venomous snake present in the south of France, the Iberian Peninsula, and western Maghreb.[5] Relatively abundant, notably in agricultural areas and bushy wastelands, this snake typically flees from encounters with humans. However, when seized, the snakes can retaliate and sometimes bite. Field herpetologists are at the highest risk of being bitten, especially during field studies or rescue operations when snakes are handled. Bites are usually quick; the snakes can open their jaws wide and the fangs may penetrate the skin. Yet, envenomation is rare and poorly documented.[6,7]

Clinical cases: Two boys (A, a 16-y-old, and B, a 13-y-old) were bitten while handling adult Montpellier snakes in southeast France, in April 2018 and in February 2021, respectively. The snake's species was identified in the field by experienced professional herpetologists. The snakes maintained their grip for 1 to several minutes. The boys displayed general symptoms (A: recurrent vomiting; B: headaches) and experienced intense pain and swelling. Both patients received care at a local emergency department, with local disinfection and second-step analgesics (treatment for mild-to-moderate pain). Blood biochemistry for each patient indicated normal status (eg, blood glucose $0.7<x<1.40$ $g{\cdot}L^{-1}$). Corticosteroids (cortisone) were applied to reduce swelling (3 d), although the usefulness of topical steroid application to treat local envenomation has not been demonstrated. Despite a lack of signs of infection, antibiotics were prescribed for prophylaxis (7 d); it should be noted that no zoonotic diseases from snakebites have been documented in the field (excluding infectious complications following snakebites associated with necrosis and inappropriate treatments). The patients recovered and had no sequelae. Further details are provided.

Boy A: A female snake (1.13 m total length) bit his right index finger, provoking pain. Five minutes later, according to the boy, local paralysis appeared. The edema impeded movements of the finger for several hours. At the end of the day, the pain resolved. The patient went home and the finger gradually recovered mobility. The edema extended to the wrist (Figure 1A) and persisted for 3 d post-bite.

Boy B: A male snake (1.17 m) bit the boy's wrist, leaving teeth marks with limited bleeding (Figure 1B). Edema appeared 1 h later and headaches 3 h later. At 3 h post-bite, the boy also suffered from local hypoesthesia (objectively recorded), possibly caused by local edema. Swelling extended to the wrist (4 h post-bite) and then halfway up his forearm (5 h post-bite) (Figures 1B and C). Headaches and edema disappeared 32 h post-bite; meanwhile slight swelling had spread to the entire forearm. Swelling completely disappeared 48 h post-bite.

Envenomation was benign and limited to localized clinical symptoms such as pain, numbness, and swelling. However, 2 reports from Spain (1979) and France (2007) described severe clinical signs of envenomation, including neurological disorders affecting cranial nerves (eg, ptosis, difficulty swallowing, dyspnea, trouble focusing) combined with extensive swelling.[6,7] In the first case, a man was bitten on the hand. In the second case, the victim was envenomed when he put his finger into the snake's mouth for unclear reasons. Both patients recovered completely.

These sporadic cases contrast with no reported cases of envenomation during a 10-y survey in which more than 1000 Montpellier snakes were handled. During fieldwork, 3 coauthors and coworkers (eg, students) estimated that in total there had been more than 100 bites (unreported). However, they all tended to ignore envenomation risks because they had no symptoms apart from minor pain.

We wish to emphasize that defensive bites inflicted on predators are very different from those involved in predation. To subdue their prey, Montpellier snakes hold

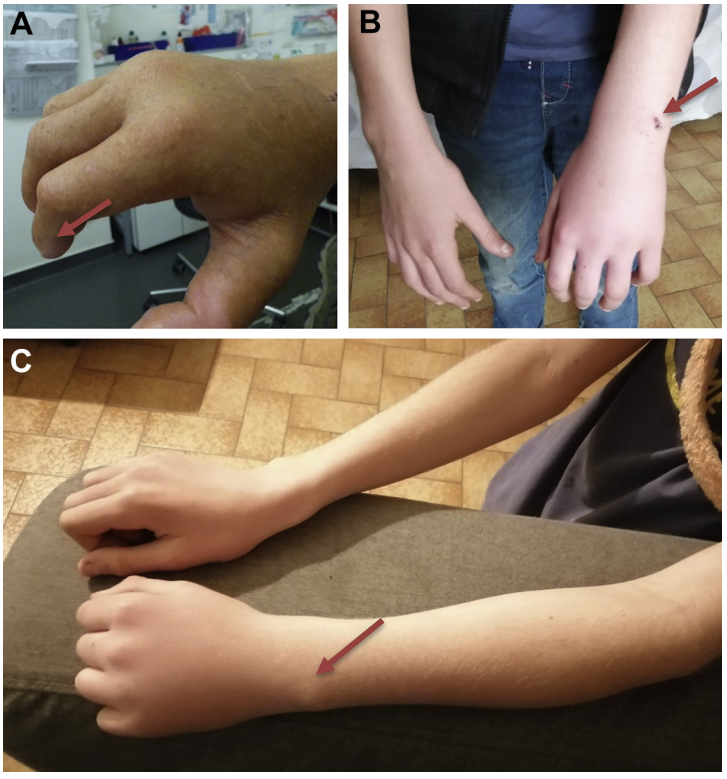

Figure 1. (A) Extension of swelling to the wrist (patient A). (B) Swelling of hand and wrist after 4 h and teeth marks indicated with arrow (patient B). (C) Extension of swelling to the forearm (patient B).

their bite and inoculate their venom while swallowing; but during defensive strikes, they bite and rapidly release their grip to escape. The fact that the snakes maintained their bite and caused envenomation in the 2 cases reported here is puzzling. In an unsuccessful attempt to release the bite, both boys pulled the head of the snake, possibly triggering a reinforcement of the defensive bite. Whatever the case, the bite lasted more than 1 min in each instance, leaving plenty of time for the venom to penetrate through the skin.

Marked signs of envenomation recorded in inexperienced handling (2 adults and the 2 boys) contrast with the lack of symptoms in well-trained handlers who have been bitten many times. In the line of discussions regarding this issue, this may suggest a possible role of psychological factors, either aggravating and/or tempering the symptoms in inexperienced vs well-trained handlers, respectively.[8,9] Further exploration of underlying mechanisms for this difference is beyond the scope of this letter. Nevertheless, both current cases and previous reports show that envenomation caused by the Malpolon snake (*M monspessulanus*) should be taken seriously. Although this species is commonly considered harmless, it should not be handled by inexperienced people, and it is crucial not to mistreat or attempt to kill snakes because this triggers potentially dangerous defensive strikes.[10]

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