

TROPICAL GROVE

A case report on *Chironex* sp. (box jellyfish) envenomation and literature review on the appropriate management

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The *Chironex* sp. or box jellyfish are extensively found in the oceans of the Philippines. Most jellyfish stings arise from this Cnidarian species. Cutaneous lesions are erythematous papules and vesicles in a ladder-like pattern. Treatment of jellyfish envenomation is directed at relieving local effects of the venom, preventing further nematocyst discharge, and controlling systemic reactions if present. We report a case of box jellyfish envenomation to provide valuable information on the clinical manifestations and proper management of both immediate and delayed reactions.

Keywords: *Chironex*, box jellyfish, envenomation

INTRODUCTION

A jellyfish is a marine animal with a round body and tentacles which belong to the phylum Cnidaria.^{1,2} It is equipped with a nematocyst, a harpoon-like structure which functions to sting its prey. The nematocyst injects a complex mixture of toxins, which are associated with

neurologic, cardiac and cutaneous repercussions.^{3,4}

The main classes of jellyfish causing human envenoming are: anthozoa (sea anemones and corals), hydrozoa (Portuguese-man-of-war and hydroids), scyphozoa (true jellyfish), and cubozoa (box jellyfish).² Some species of the box jellyfish such as *Chironex fleckeri* and *Chironex yamaguchi* are potentially lethal.⁵ They are multitentacled with a bell up to 35 cm in diameter and each tentacle contains billions of nematocytes.⁶ Both species are widely distributed in the Philippine seas.

Envenomations usually result in three main types of reactions: immediate allergic, immediate toxic and delayed allergic responses. The most common reaction is a local sting that results in linear, painful erythema, papulovesicles, and pustules at the areas of tentacular contact.^{3,7} The lesions are of variable duration and might be hemorrhagic, necrotic or ulcerative.⁸ Fatalities may occur due to hypersensitivity or can be induced by the effect of various toxins on the heart, lungs or kidneys.³

We report this case of *Chironex* sp. envenomation to promote awareness of the various clinical manifestations of envenomation and to ensure immediate and proper patient care. Relevant articles on the proper management of box jellyfish stings were reviewed and are presented.

CASE REPORT

A 15-year-old female presented at the emergency room with a jellyfish sting on the left posterior thigh, distal third of left leg, and right foot which she sustained while swimming along the coast of Agdangan, Quezon in May 2015. The patient recalled that immediately after the sting, she developed linear erythematous patches associated with intense burning sensation and swelling. She applied vinegar on the lesions and took an analgesic. A few hours later, the lesions on the left leg developed multiple bullae. The witnessing relatives claimed that the offending species is the box jellyfish, which is locally called “*quatro kantos*”. A box jellyfish caught in the same area and preserved in 4% formaldehyde was brought to the University of Santo Tomas Research Center for the Natural and Applied Science in Manila, and was identified as *Chironex* sp. (Figure 1).

Cutaneous examination revealed multiple linear erythematous patches on the left posterior thigh and right foot. The lesions on the distal third of her left leg were multiple vesicles and bullae on an erythematous base with areas of ulceration. The lesions were discrete as well as confluent in a linear fashion in parallel rows (Figure 2).



Figure 1. *Chironex* sp., multitentacled box jellyfish which is widely distributed in Philippine seas.

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Figure 2. Multiple vesicles and bullae on an erythematous base in a ladder-like pattern on the distal third of the left leg.

Histopathology showed a basket-woven stratum corneum. There was spongiosis of the epidermis with exocytosis of lymphocytes, few red blood cells and some necrotic keratinocytes. There was also papillary edema and a superficial to mid-dermal inflammatory infiltrate of lymphocytes, histiocytes and plasma cells. Pigment-laden melanophages were also seen. No nematocysts were observed on the sections examined (Figure 3).

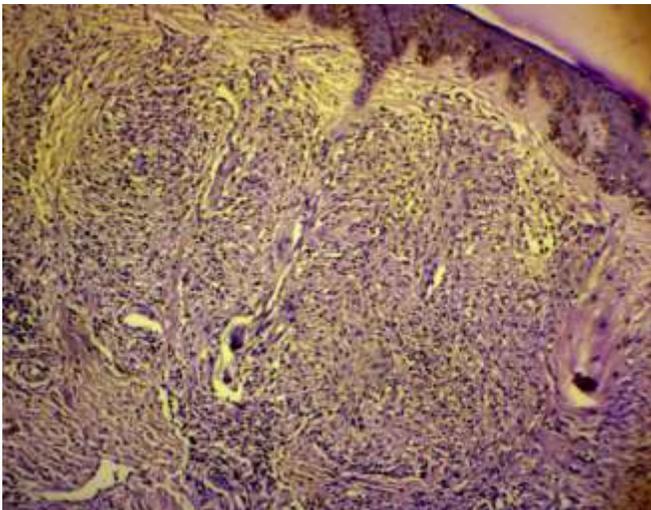


Figure 3. Mild papillary edema and a dense superficial to mid-dermal inflammatory infiltrate of lymphocytes, histiocytes and plasma cells (H and E X 400).

Treatment was started with intravenous hydrocortisone 100mg every 12 hours for 2 doses, to decrease inflammation and vesiculation and to prevent systemic complications. She was discharged improved from the emergency room after a 24-hour observation period. The skin lesions significantly subsided with a one-week course of 40mg oral prednisone daily, and twice daily application of clobetasol propionate 0.05% and mupirocin creams (Figure 4).



Figure 4. Multiple linear atrophic erythematous patches with areas of ulceration and crusting on distal third of left leg after a 2 week course of systemic corticosteroids and topical steroid and antibiotic creams.

DISCUSSION

Jellyfish stings are one of the most common envenomations due to exposure from marine environments.⁹ Cutaneous reactions from contact with the toxin-releasing organelles or nematocysts of these cnidarians vary significantly, depending primarily on the organism involved, the concentration of the sting, and the patient's sensitivity.^{1,7}

Immediate local skin reactions to jellyfish stings occur in the form of tenderness, burning, and pruritus with small papules in a whiplash pattern or a cluster of small wheals or papules often surrounded by an erythematous, raised area.^{1,3,10} The lesions may become papulovesicular, hemorrhagic, necrotic or ulcerative. Other associated symptoms include weakness, vertigo, nausea, headache, muscle spasms, diaphoresis, paresthesia, lymphadenopathy and arthralgias. Similarly, our patient presented with vesicles, bullae and patches in a linear pattern with associated pain and edema.

The pattern of the sting may provide some clues to the type of jellyfish.¹¹ An annular or ladder-like pattern may suggest a box jellyfish sting, whereas a linear, flagellate pattern is suggestive of a chirodroid or carybdeid sting.¹² Our patient presented with long linear lesions in parallel rows or ladder-like pattern that are compatible with envenoming by a *Chironex* species or box jellyfish. Moreover, the *Chironex* species are found in the oceans of Quezon especially during summer months.

Treatment of jellyfish envenomation involves alleviating the local effects of the venom, preventing further nematocyst discharges and controlling systemic reactions. Oral or topical analgesics, hot water and ice packs are effective painkillers. The application of vinegar (4-6% acetic acid) has always been believed to prevent further discharge of nematocysts.¹³ However, an in-vitro study by Welfare and colleagues showed that application of vinegar was associated with further discharge of *Chironex fleckeri* venom. Past evidence showed

that vinegar completely inactivates undischarged nematocysts but recently it has been postulated that it causes additional venom to be expressed from the discharged nematocysts through a chemically medicated process of nematocyst wall contraction.¹⁴ Freshwater, alcohol and methylated spirits should be avoided since they could massively discharge nematocysts. Pressure immobilization bandaging should also be avoided as it stimulates additional venom discharge too.^{8,13} The remaining tentacles should be removed with a knife edge or gloved hand. A paste of seawater and baking soda, talc, flour or dry sand also serve the same purpose of removing clinging tentacles.⁸ Local reactions may also be treated with topical anesthetics, antihistamines and corticosteroids.¹ Acetylsalicylic acid, indomethacin, or ibuprofen are used in prolonged, persistent reactions because of the reduction in cutaneous vasopermeability defect that they provide.⁸

In our case, the patient applied vinegar, which possibly aggravated the lesions. A large proportion of discharged nematocysts might have been present at the time of application. The patient was given systemic corticosteroids upon consult at our institution to control the inflammation. Marked improvement was then noted after two weeks with residual hyperpigmentation.

Mild anaphylaxis may be treated with antihistamines with or without epinephrine. Severe cases are treated with oxygen supplementation, aggressive airway management, and intravenous fluids.¹ Antivenom is available for *C. fleckeri* stings.⁹ In a life-threatening situation, up to three vials of the antivenom together with magnesium sulfate as an intravenous bolus may

be given. This combination prevents cardiovascular collapse.⁶ Refractory hyperpigmentation may be controlled with topical hydroquinone preparations and keloids are treated with topical or intralesional steroid injections.¹

Mechanical barriers to jellyfish at the beach have proven to prevent stings. Nets and stinger suits or form-fitting pajama like garments may be used. Sunblock containing jellyfish and "sea lice" repellent should be applied prior to swimming.¹⁵ In general, people should avoid swimming in infested waters and not touch even dead or beached jellyfish.

CONCLUSION

Jellyfish are responsible for the most common human envenomation acquired from bathing in the sea. Knowledge of the location, time, environmental circumstances of the stinging and pattern of lesions will aid in identification of the jellyfish. Furthermore, familiarity with jellyfish stings will aid in prompt diagnosis and appropriate management. The application of vinegar compresses immediately after box jellyfish envenomation is still controversial and is presently not recommended by the authors. Further studies should be conducted to establish whether vinegar actually prevents or promotes further discharge of nematocysts.

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