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REVIEW ARTICLE

Jellyfish Stings: A Practical Approach

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Jellyfish have a worldwide distribution. Their stings can cause different reactions, ranging from cutaneous, localized, and self-limited to serious systemic or fatal ones, depending on the envenoming species. Several first aid treatments are used to manage such stings but few have evidence behind their use. This review of the literature describes and discusses the different related first aid and treatment recommendations, ending with a summarized practical approach. Further randomized controlled trials in this field are needed.

Key words: jellyfish, medusa, marine stings, marine envenomation, *Cnideria*

Introduction

Jellyfish envenomation has become a serious health problem on coastal beaches throughout the world, but especially subtropical and tropical Atlantic, Pacific, Asian, and Australian coasts where the most notorious jellyfish species prevail.[1] Jellyfish are marine invertebrates belonging to the phylum *Cnidaria*, which is subdivided into 5 classes (Table 1): 1) *Hydrozoa*, which are not considered true jellyfish and include the *Physalia* species, which are siphonophores; the 2 major *Physalias* are *Physalia physalis*, known as the Portuguese man-of-war, and the *Physalia utriculus*, known as the Blue bottle;[2] 2) *Scyphozoa*, the true jellyfish, include *Cyanea capillata*, known as the lion's mane jellyfish, and *Pelagia noctiluca*;[2] 3) *Cubozoa*, similar in form to the true jellyfish but more boxlike; 2 different orders are recognized: the large multitentacled chirodropids, which are among the most dangerous marine creatures and include *Chironex fleckeri*, known as the Australian box jellyfish, and the smaller 4-tentacled carybdeids, an example of which is *Carukia barnesi* (also known as an Irukandji jellyfish), which causes Irukandji syndrome;[2] 4) *Anthozoa* are unique among cnidarians in that they do not have a medusa stage in their development; examples are soft corals and sea anemones; and 5) *Staurozoa* were conventionally considered to be an order in the class *Scyphozoa*, however, recent genetic studies suggested they should be elevated to class of their own; unlike most jellyfish, they do not have a free-swimming medusa stage, rather, the adult animal is a sessile polyp.[3] Species distribution varies geographically (Table 1).[4]

Cnidaria classically have bodies consisting of a jellylike substance enclosing the internal structures, from which structures called tentacles are suspended. Each tentacle is covered with thousands of cells called cnidocytes or nematocytes that house an organelle called a cnidocyst or nematocyst containing stinging barbed threads or tubules. Mechanical or chemical stimulation, or both, causes a large concentration gradient of calcium across the cnidocyte plasma membrane. The resulting osmotic pressure leads to water influx and increased pressure inside the nematocyst, causing the threads to uncoil and spring out like tiny darts firing venom into the victim.[5] These venoms differ in composition, biological activity, and potency among different species. Jellyfish venoms are complex and could be composed of potent proteinaceous cell membrane pores forming toxins, neurotoxic peptides, bioactive lipids, catecholamines, histamine, hyaluronidases, fibrolysins, kinins, phospholipases, and various hemolytic, cardiotoxic, nephrotoxic, myotoxic, and dermonecrotic toxins.[2,6–8] Both the venom components and the tubule biopolymers can initiate different types of immunological responses—innate, adaptive, immediate, or delayed hypersensitivity reactions—that can be amenable to anti-inflammatory and immunomodulatory treatment.[9] Thus, analyzing each species-specific venom allows for appropriate and effective treatment.[9]

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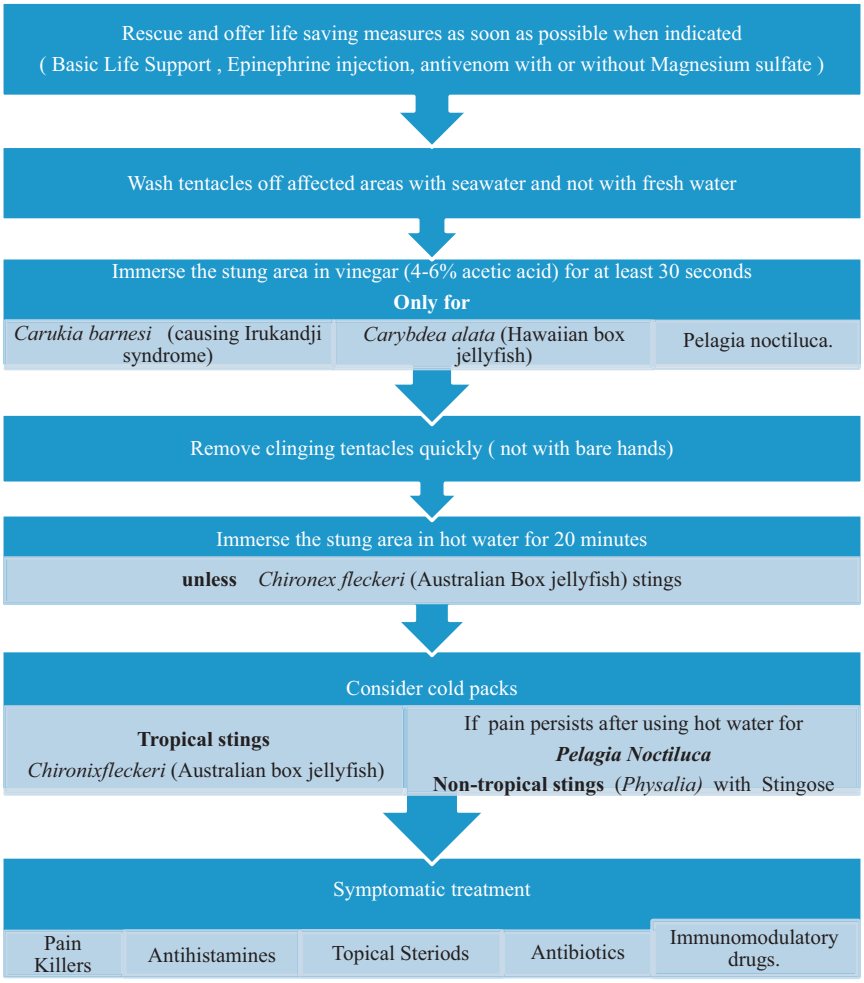

Figure. Jellyfish sting management flowchart.

Methods

A review of the literature was performed to describe the different reactions to jellyfish stings and to point out the related evidence-based preventive and therapeutic management.

REACTIONS TO JELLYFISH STINGS

In general, reactions to jellyfish stings vary from the usual nonsystemic, localized skin reactions to the rare systemic life-threatening ones, depending on the species of the envenoming organism, the duration and extent of exposure, the number of nematocysts discharged, affected body area, location and thickness of affected skin, health, weight, age, and reaction of the host to envenomation, and the initial treatment administered.[10,11]

Local and immediate skin reaction occurs within minutes to hours at the site of the sting and is mainly related to the toxic effect of venom. This reaction is the most common presentation of a jellyfish envenomation.[12] Classically, the lesions are linear, urticarial, painful, and erythematous at the areas of tentacular contact.[12] A few days later, the lesions can become vesicular, sometimes hemorrhagic, and even necrotic or ulcerative in certain cases, as in *Chironex fleckeri* stings.[5,12–14] Regression and resolution of the blisters and pruritus may take as long as 10 days; however, mild hyperchromia and slight roughness in skin texture may still be observed for as long as 8 months after the sting.[11] The pain is mainly due to the effect of exogenous or endogenous mediators such as kininlike factors on cutaneous nerves.[12]

Generalized skin eruptions or eruptions distant from the primary sting have been reported and are probably