



## BRIEF COMMUNICATION

***Carybdea marsupialis* (Cubozoa) in the Mediterranean Sea: The First Case of a Sting Causing Cutaneous and Systemic Manifestations****Cesar Bordehore, MSc,\* Santiago Nogué, MD, PhD,<sup>†</sup> Josep-Maria Gili, MSc, PhD,<sup>‡</sup> Melissa J. Acevedo, MSc,<sup>‡</sup> and Verónica L. Fuentes, MSc, PhD<sup>‡</sup>**

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A woman stung by the box jellyfish *Carybdea marsupialis* (Cnidaria, Cubozoa) at a Spanish Mediterranean beach showed systemic manifestations over several months [pain far from the inoculation point, arthralgia, paresthesia, hyperesthesia, increase in eosinophils and immunoglobulin E (IgE)] in addition to the skin condition.

*Carybdea marsupialis* (Linnaeus, 1758) is the only box jellyfish found in the Mediterranean, where it is occasionally observed in low densities. However, since the 1980s, high-density populations have been detected in the Adriatic Sea.<sup>1</sup> Since summer 2008, first aid services in Denia beaches have recorded high numbers of people stung (year 2008: 3,330 stung people; 2009: 3,350; 2010: 1,348; 2011: 2,316; 2012: 3,040; and 2013: 1,872). These stings were mainly by *C. marsupialis*. The density of *C. marsupialis* has been high since summer 2008<sup>2</sup> (at ~1 m depth, mean density approximately five individuals per 100 m<sup>2</sup> with punctual maximums of more than 200 adult individuals per 100 m<sup>2</sup>). The adult phase of *C. marsupialis* coincides with the summer months and thus there is an increased probability of this jellyfish stinging swimmers. Adults have an umbrella height of around 4 cm, and their shape resembles an “ice cube,” with only four fine tentacles of between 5 and 15 cm.

The effects of the *C. marsupialis* sting on humans were described in the Adriatic in 1992<sup>3</sup> and 1997,<sup>4</sup> with only dermatitis being described in patients. Here we present the first case of a *C. marsupialis* sting that resulted in cutaneous and systemic manifestations.

**Case Report**

A 37-year-old Spanish Caucasian woman was accidentally stung by a jellyfish later identified as *C. marsupialis*. She was on a holiday and was stung while swimming at midday on August 10, 2012 at Les Marines beach in Denia (Spain) (38°51'29.73"N, 0°4'17.44"E). The water depth was 0.8 to 1 m and the woman felt two stings simultaneously, one on the left side of her abdomen and one on her right thigh. The sting was not painful and no treatment was applied, but that night her toes swelled up and became sore and itchy. The following day she observed the appearance of blisters on the contact area (Figure 1). A topical treatment with a cream containing methylprednisolone was applied, leading to a slow and progressive improvement in the skin sores, which took 20 days to heal without skin sequelae.

Seven to ten days after the sting, she developed arthralgia and paresthesia in her hands. The pain was intense and occasionally prevented her from sleeping. On other occasions, the pain woke her up and she found it difficult to move her hands, with the occurrence of hyperesthesia and cramps. She was treated with ibuprofen, without any clinical response.

The second set of symptoms appeared 20 days after the sting, when her inner right forearm around the elbow began to swell, accompanied by a sensation of intense heat and burning. On touching the area, it was found to be swollen but not painful. After 4 or 5 days, a similar swelling appeared on her right shoulder.

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**Figure 1** Erythematous lesions and blisters on the left side of the patient's abdomen 24 hours after the sting.

One month after the sting, neither the pain nor the loss of strength in her hands had ceased. The paresthesia and the hyperesthesia prevented her from sleeping properly. As the symptoms persisted, she visited a doctor, who took radiographies of her cervical spine and upper extremities, and did an electromyography, both of which were normal. The doctor also performed general analyses, which revealed a high degree of eosinophils (632 cells per  $\mu\text{L}$ ) as the only significant finding. The patient continued to be treated with non-steroidal anti-inflammatory drugs.

Two months after the sting, the neurological symptoms as well as the articular and cutaneous manifestations were decreasing progressively, although she occasionally had macules and papules again on both her hands and abdomen (Figure 2). The patient was sent to the Clinical Toxicology Unit of the Hospital Clinic de Barcelona where her immunological status was assessed. The assessment showed an increase in immunoglobulin E (IgE) (558 kU/L, reference value <100 kU/L), and an allergy to *Anisakis* (0.76 kU/L, reference value <0.35) and prawns (0.57 kU/L, reference value <0.35). The patient was advised to avoid these items because she had been found to be hypersensitive to them. Her clinical manifestations improved progressively.

## Discussion

Purified venom of *C. marsupialis* from the Adriatic Sea<sup>5</sup> produced hemolytic activity in sheep red blood cells, but not in human or rabbit cells. The toxin was also heat labile and was inactivated by proteases. Studies in the Caribbean<sup>7</sup> found a novel neurotoxin and three cytotoxins with extremely powerful hemolytic activity on human red blood cells. These differences in toxicity between the two studies could be due to methodology or



**Figure 2** Areas with edema and erythema on the abdominal region 2 months after the sting.

geographic differences, or even because different species were used.<sup>6</sup>

The systemic symptoms shown by our patient have been reported for other Cubozoan species but never for the Mediterranean *C. marsupialis*. In the Adriatic, symptoms of 41 patients were described as nonserious and of local toxicity,<sup>3,4</sup> and after 2 weeks all symptoms had disappeared (swelling, soreness, and burning sensation), but seven patients showed red-violet scars and one developed a keloid scar probably caused by the use of ammonia. Symptoms were defined as irritant rather than allergic because none of the patients had ever had any previous contact with the jellyfish.

Arthralgias and paresthesias have been associated with *Chinorex fleckeri* (Fam. Chirodropidae) stings in Australia, and a few times with *Carybdea alata* (Fam. Carybdeidae) in Hawaii.<sup>7</sup> Hyperesthesia was described in a patient after a cubozoan sting, probably *C. fleckeri* or *Carybdea* sp.<sup>8</sup> in Papua New Guinea. *Carybdea alata* in Hawaii has produced paresthesia and cramps.<sup>9</sup> A high number of eosinophils have been described after a sting of an unknown jellyfish in the Red Sea,<sup>10</sup> probably a cubozoan judging from the appearance of the linear scar with small spots.

Considering the high IgE values in our patient several months after the sting, we believe that her clinical manifestations could have been due to an allergic hypersensitivity to the cubozoan venom, although we cannot rule out the allergy to *Anisakis* and prawns. The patient did not have a personal or family history of atopy, bronchial asthma, or allergies to medication, and she had never associated these clinical manifestations to food intake.

The case presented here is the first one in which, after a *C. marsupialis* sting, the patient showed a systemic reaction following the skin condition that lasted for months. This marks a turning point in terms of the recognition of the toxicity of this species for humans. Beach managers should take the presence of this species in swimming areas seriously, particularly because the

adult medusae are active swimmers that choose their habitat and do not simply drift with the current like other jellyfish (Scyphozoa). If a high density of *C. marsupialis* adults is detected, competent health and environmental authorities should take measures to reduce the risk of contact.

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### Declaration of Interests

The authors state they have no conflicts of interest to declare.

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