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BRIEF COMMUNICATION

Portuguese man-of-war (*Physalia physalis*) envenomation on the Aquitaine Coast of France: An emerging health risk

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Context. The Portuguese man-o-war is a cnidaria classically found in tropical waters. It can cause serious and even life-threatening envenomation in swimmers, surfers and seafarers. Presence of the Atlantic species *Physalia physalis* has long been reported in European coastal waters but was always an exceptional event. *Objective.* To describe the experience of the Bordeaux Poison centre about *Physalia* stings since the first collective episode reported in 2008. *Methods.* Clinical retrospective description of cases series of *Physalia* envenomations reported to the local poison centre from 2008 to 2011 inclusive. *Results.* In the summer of 2008, multiple-case incident involving 40 victims were recorded on the same day on one beach in the Southern French Atlantic coast. The following year in 2009, no envenomation cases were reported in the same area, but in the next 2 years, numerous man-of-war envenomations occurred along the Aquitaine coast, that is, 154 cases in 2010 and 885 in 2011. Portuguese man-o-war stings led to severe manifestations with 15–20% of patients suffering of general symptoms that were sometimes severe enough to be considered as potentially life-threatening (8% of patients in 2011, most frequent signs: muscle pain and cramps with fasciculations, confusion and drowsiness, fainting, respiratory distress). No deaths due to Portuguese man-o-war envenomation were reported over the 4-year study period. *Conclusion.* The results suggest that national multidisciplinary summer surveillance program in the Aquitaine coast is required in order to provide alerts to the public, to better identify patients at risk for developing severe clinical symptoms, and hopefully to improve quality of health care.

Keywords *Physalia*; Portuguese man-of-war; Marine envenomation; French Atlantic Coast

Introduction

The Portuguese man-of-war is a special life form consisting of a colony of highly specialized individual organisms that attach together to give the appearance of a single creature with different organs (pneumatophore, tentacles, etc.). Like all cnidarians, Portuguese man-of-war has venomous cells called cnidocytes, nematocytes or cnidoblasts in the tentacles.[1] These are used to inject venom into prey. Contact with human skin may lead to envenomations with local symptoms (immediate and intense pain, skin inflammation with necrotic evolution) and possible general symptoms (cardiac and/or neurological manifestations with central nervous system depression and respiratory distress in the most severe cases). The main toxin of the man-of-war venom is a glycoprotein of 240 kDa which is called Physaliatoxin (potent cytotoxic and haemolytic toxicity), but numerous other components (enzymes, proteins) have been isolated from this venom.[2] The mechanism of its neurotoxic and cardiotoxic action is still unclear.[2] In tropical waters, where Portuguese man-of-war specimens are numerous, stings are reported in swimmers and people with sea-related jobs.[3] Each year the Indo-Pacific species *Physalia utriculus* (bluebottle for the Australians) causes numerous stings in Australia and Polynesia all the way to Hawaii.[1,4] The only Atlantic Ocean species is *Physalia physalis*: it is able to induce severe[5] to fatal envenomations[6–8] and can have a variable appearance since its pneumatophore may be more or less developed and coloured depending of several environmental factors. The pneumatophore enables the organism to move either by drifting with current or sailing on wind using the crest of its floater as a sail. For this reason, Portuguese man-of-wars specimens are sometimes found far away from their usual warm water habitats.

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Portuguese man-of-war has been reported in the waters of the North Atlantic including in European coastal waters. Articles reporting the sporadic presence of Portuguese man-of-war along the Southern French Atlantic coast (Aquitaine) have been published in the local press since as early as 1950.[9,10] Since 2008, the Bordeaux Poison Control Center that monitors poison-related events in the Aquitaine region has been keeping specific records on tropical cnidarian envenomation on local beaches during the summer season. Identification of the species is easy since Portuguese man-of-war is clearly distinguishable from local jellyfish due to the presence of the pneumatophore. In addition, clinical manifestations of Portuguese man-of-war stings are different than those induced by local venomous sea species (large implicated skin surface, presence of general symptoms). The purpose of this study is to describe the emerging health risk posed by Portuguese man-of-war envenomation in Aquitaine based on the experience of the Bordeaux Poison Control Center during the summers from 2008 to 2011 inclusive.

Methods

This is a retrospective case series description of the experience of one poison centre which is in charge of the concerned area (Southern French Atlantic Coast). According to the French law, no waivers and no ethical approvals are necessary for the simple description of Poison Centre (governmental depending structure) case series with no inclusions in a clinical trial (no new treatments or protocols, no supplementary biological samples).

After the unpredictable case series of 2008, a specific report form for Portuguese man-of-war stings containing several items (age and sex of victim, zoological identification, if possible photograph of lesions, simple description of the clinical feature and of the prescribed treatments) was provided to the 24 first aid stations all along the Aquitaine coast. The objective of this form was to obtain the maximum of details for each patient even in case of collective envenomations concerning numerous victims. One questionnaire was completed for each patient by the paramedics and by the physicians in case of medical intervention (systematic physician consultation in case of general symptoms). The form was non-anonymous and included a non-obligatory request for the telephone number of the victim or a family member to allow follow-up of the outcome of the sting by the Bordeaux Poison Control Center (follow-up by the local Poison Centre specialists considered by French authorities as compulsory in case of health alert, with no special necessary authorizations according to the French laws as it is an important mission of the toxicovigilance unit of the French Poison centres). The Bordeaux Poison centre specialists reviewed by telephone or by direct medical consultation if necessary several items: course of the clinical symptoms during 2 days to several months if necessary, validation of the paramedics/emergency teams/physicians/hospital data, confirmation of the zoological identification (iconography) by the "French Research Institute for exploitation of the sea" (French acronym, IFREMER = Institut Français de Recherche pour l'Exploitation de la MER). After validation, all cases were coded in the French National Database of Poisonings collected by the 10 French Poison Centres (French acronym SICAP with automatic removal at the national level of the non-anonymous details). Extraction of the series was performed by the authors in order to allow the elaboration of the health alert.

The zoological identification of the implicated cnidarians was performed by the IFREMER where biologists and oceanographers work. However, the specialist intervention was not always necessary as the pneumatophore is a typical *Physalia* organ that is difficult to misidentify, even by the public[9,10]: photography of the responsible animal given by the victims themselves or by their family (immediate transmission of the image from the beach to the poison centre by smartphones) was often considered as sufficient when the presence of pneumatophore was proven.

Results

Study data is summarized in Table 1. The first 40 cases in the summer of 2008 occurred simultaneously on the same day and same beach in Biscarosse ("Les Landes" department 40 in France). This event being totally unprecedented and unexpected, data collected during the emergency was subsequently transmitted to the local Poison Control Center. However, since all 40 cases were managed at the same first aid station, emergency medical unit (French acronym, SAMU), and hospital facility, the data was consistent and provided a sound basis for issuing an alert by local and national health authorities. After the 2008 multiple-victim incident, no case was recorded in 2009. It was not until 2010 that the number of sting victims began to rise with 154 cases reported over a period of 6 weeks. A total of 885 cases were reported in 2011 during a longer period of 14 weeks. Victims included swimmers of all ages and both sexes but case series analysis showed that young men were more frequently injured. The high percentage of patients presenting general manifestations in 2010 is due to the bias induced by first aid givers reporting only this year cases with necessary medical management (meanwhile all the 2008 and 2011 cases – including cases with only paramedics management – were reported to the Bordeaux Poison Centre).

The zoological identification of three specimens of *Physalia physalis* captured the same afternoon of summer 2008 in the concerned beach was confirmed by the local laboratory of the IFREMER. The sea-life specialists consulted then confirmed also that no other specimens were reported along the French Atlantic coast the same year. During 2009, the Bordeaux Poison Centre, the coast guards and the biologists of the IFREMER did not notice any sign of the presence of Portuguese man-of-war in Aquitaine. The following summers, the IFREMER confirmed the presence in Aquitaine of numerous *Physalia* specimens from mid-July to mid-August in 2010 and from the end of June to the

Table 1. Characteristics of *Physalia physalis* envenomations observed in the Atlantic coast of Southern France by the Bordeaux Poison Centre since 2008.

Man-of-war envenomations		2008	2009	2010	2011
Patients	n	40	0	154	885
	Median age, years (range)	18 (4–55)	/	14 (3–62)	13 (1–86)
	Sex-ratio (M/F)	1.66	/	1.68	1,46
Circumstances	Period of year	Mid-August	/	Mid-July to mid-August	End-June to end-September
	French department codes	40	/	40, 64, 33	40, 64, 33
Clinical feature	Skin burns	40 (100%)	/	154 (100%)	885 (100%)
	Intense pain	40 (100%)		154 (100%)	885 (100%)
	General symptoms including	8 (20%)	/	80 (52%)	133 (15%)
	Respiratory distress	4 (10%)	/	12 (8%)	44 (5%)
	Neurological	4 (10%)	/	42 (27%)	53 (6%)
	Musculoskeletal	4 (10%)	/	39 (25%)	70 (8%)
	Digestive signs	1 (2.5%)	/	29 (19%)	71 (8%)
Medical management	Hospitalization	8 (20%)	/	18 (12%)	71 (8%)
	Decontamination and local treatments	40 (100%)	/	154 (100%)	885 (100%)
	Intravenous medications	4 (10%)	/	11 (7%)	88 (10%)
Clinical course	Average local pain duration (range)	4 hours (1–6)	/	3.5 hours (1–4)	4 hours (1–10)
	Definitive dermal marks	11 (28%)	/	45 (29%)	Not available

French administrative department codes: 33 = Gironde; 40 = Landes; 64 = Pyrénées Atlantiques (33 + 40 + 64 = the entire Aquitaine coast). Intravenous medications were central analgesics (opioids), benzodiazepine and/or corticosteroids. In the clinical course, the dermal marks were considered as permanent after 6 months with no improvement.

end of September in 2011. Envenomations were observed and declared to the Bordeaux Poison Centre during exactly the same periods, confirming that the Portuguese man-of-war induces health consequences as soon as this species is present on this busy coast.

In the clinical point of view, as shown in Table 1, local symptoms were reported in all envenomed patients and always appear immediately with intradermal oedema along the path of tentacle contact. Close examination of the lesions reveals multiple venom injection sites. In most cases, lesions progress within 24 hours to local skin necrosis with formation of multiple scabs that disappear within 2 weeks leaving a purplish or erythematous scar that may be visible for a prolonged period or permanent. General symptoms were reported in many of the patients (Table 1) with frequent gastrointestinal manifestations (abdominal pain, vomiting), muscular signs (aching, cramps, spasms and fasciculations), and in the most severe cases neurological (drowsiness, diffuse sweating, mental confusion, fainting) and cardio-respiratory symptoms (dyspnea, precordialgia). Symptoms disappeared either quickly before medical treatment can be undertaken (symptoms reported by first aid caregivers or by the victims) or last for several hours. In the summer-2011 data, 8% of patients presented general manifestations of sufficient intensity like respiratory distress (third level in the poisoning severity score according the PSS definition)[11] to be considered as life-threatening by the attending physician of the SAMU or of the hospital emergency unit.

The clinical course of the envenomations induced by Portuguese man-of-war during this study was characterized by a high percentage of definitive (still present after a six-month follow-up) dermal marks and pigmented scars (about 30% of the patient in 2008 and 2010, data not yet available for 2011). No fatal case of Portuguese man-o-war envenomation was recorded between 2008 and 2011 in the French Atlantic coast.

Discussion

Prior to the unique multiple-victim incident in 2008, man-of-war envenomation was an anecdotal event in the French Atlantic coast and did not involve several patients. The summer periods of 2010 and 2011 witnessed a marked increase in the number of stings as well as of Portuguese man-of-war washing up on beaches along the Aquitaine coast. It thus appears that the three specimens implicated in the 40 envenomation cases recorded on the same day in August 2008 were followed by several hundred specimens that infested the waters during several summer weeks in 2010 and 2011 and that induced numerous poisonings. The induced clinical features in Northern Atlantic were similar to those reported in Brazil with the same species[3] and in Australia with the more little bluebottle,[12] showing that the toxicity of these tropical cnidarians is not decreased in the temperate/cold waters of the Northern Atlantic Ocean.

Management of the envenomed patients of our series consisted of immediate decontamination (rinsing sting area liberally with seawater and removal of any tentacles using shaving cream) with symptomatic treatment in case of severe pain and general manifestations,[1–3] including painkillers (acetaminophen and/or opioids), corticoisteroids and/or anxiolytic drugs (benzodiazepines). Vinegar application usually used for jellyfish envenomation in France was not proposed in case of *Physalia* contact as a recent publication emphasized that this treatment is still controversial (possible increased venom release of the *Physalia* genus).[3] Another recent publication suggests that immersion in water at 45°C for 20 minutes is an effective and practical treatment for pain from bluebottle (*Physalia utriculus*) stings in Australia.[12] This treatment was not proposed in our study as the species in Aquitaine is different and because it was considered by the health authorities as too difficult to perform in case of collective accident with numerous patients to manage at the same time.

Taking this emerging risk seriously, national and local authorities have set up a multidisciplinary monitoring and alert system, named "Physatox" with the participation of healthcare (Poison centres, coast guards, coastal emergency units), scientific (IFREMER for zoological identifications and evaluation of the bloom intensity) and governmental and territorial organizations (local and national authorities for administrative decisions like beach closings or media alerts). The authorities' fears do not only concern the health consequences but also the tourism disturbances induced by the numerous beach closings with huge economic impacts. Up to now, no scientific explanation has been put forward to account for this phenomenon that could be multifactorial (Climate change? Disappearance of predatory species due to overfishing? Other undiscovered reasons at the origin of this phenomenon in 2008, 2010 and 2011 and not 2009?).[13]

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

References

1. Fenner PJ. Dangers in the Ocean: the traveller and marine envenomation. J Travel Med 1998; 5:135–141.
2. Suput D. In vivo effects of cnidarians toxins and venoms. Toxicon 2009; 54:1190–1200.
3. Haddad Junior V, Silveira FL, Migotto AE. Skin lesions in envenoming by cnidarians (Portuguese Man-of-war and jellyfish): etiology and severity of accidents on the Brazilian coast. Rev Inst Med Trop Sao Paulo 2010; 52:47–50.
4. Chui JJ, Ooi KG, Reeves D, Francis IC. Bluebottle envenomation-induced crystalline keratopathy. Cornea 2011; 30:835–837.
5. Giordano AR, Vito L, Sardella PJ. Complication of a Portugueses Man-of-war envenomation to the foot: a case report. J Foot Ankle Surg 2005; 44:297–300.
6. Burnett JW, Gable WD. A fatal jellyfish envenomation by the Portuguese man-o-war. Toxicon 1989; 27:823–824.
7. Stein MR, Marraccini JV, Rothschild NE, Burnett JW. Fatal Portuguese man-o-war (*Physalia physalis*) envenomation. Ann Emerg Med 1989; 18:312–315.
8. Fenner PJ, Williamson JA. Worldwide deaths and severe envenomations from jellyfish stings. Med J Aust 1996; 165:658–661.
9. Labadie M, Lambrot AL, Mangwa F, de Haro L, Bragança C, Chanseau P. Collective envenomation by *Physalia physalis* on the French Atlantic coast [abstract]. Clin Tox (Phila) 2010; 48:309.
10. Labadie M, Groult V, de Haro L, Jonquiert-Latarjet A, Chanseau P. Epidemic *Physalia physalis* stings on the French Atlantic coast during summer 2010 [abstract]. Clin Tox (Phila) 2011; 49:226.
11. Persson HE, Sjöberg GK, Haines JA, Pronczuk de Garbino J. Poisoning severity score. Grading of acute poisoning. J Toxicol Clin Toxicol 1998; 36:205–213.
12. Loten C, Stokes B, Worsley D, Seymour JE, Jiang S, Isbister GK. A randomized controlled trial of hot water (45°C) immersion versus ice packs for pain relief in bluebottle stings. Med J Aust 2006; 184: 329–333.
13. de Haro L. News in marine toxicology. Ann Toxicol Anal 2011; 23:113–117.