

CLINICAL CASE

Severe case of rhabdomyolysis
following jellyfish envenomation in the
Mediterranean Sea

Giorgio Buscetta,¹ Chiara Rizzo,¹ Lidia La Barbera,¹ Federica Camarda,¹
Antonino Federico,² Benedetto Maria Garbo,³ Ada Maria Florena,³
Giuliana Guggino ¹

To cite: Buscetta G, Rizzo C, La Barbera L, *et al*. Severe case of rhabdomyolysis following jellyfish envenomation in the Mediterranean Sea. *RMD Open* 2023;**9**:e003569. doi:10.1136/rmdopen-2023-003569

Received 24 August 2023
Accepted 16 October 2023

ABSTRACT

Jellyfish envenomation is a common problem in coastal areas all over the world; usually symptoms are self-limited with no long-lasting complications. Despite that, some jellyfish species, mainly populating the Indian Ocean, are renown to be potentially lethal and in some cases may cause severe myopathy. We report the first case of rhabdomyolysis following a jellyfish sting in the Mediterranean Sea. A 17-year-old patient was admitted to the intensive care unit of our hospital in life-threatening conditions. He was dyspnoeic and dysphagic with pain and functional impairment of upper and lower limbs. The evidence of a red mark in his face and the clinical presentation, coupled with the diagnostic test performed, allowed the diagnosis of toxidrome from jellyfish venom. Treatment with hydration, ventilatory support and steroids led to a progressive improvement of patient conditions. Our case report stresses the importance of prompt identification and treatment of potential rhabdomyolysis determined by jellyfish and rises awareness on the presence of such venomous species in the Mediterranean Sea.

INTRODUCTION

Jellyfish envenomation is a common medical problem all over the world with significant concerns related to the presence of potentially lethal species in warm tropical waters.¹ Up to date, no many reports of severe envenomation in the Mediterranean Sea are available, but the presence of exotic and dangerous species of jellyfish has already been pointed out.²

Jellyfish envenomation is mediated by their tentacles that contain cnidocytes, cells in which the venom is secreted and stored in nematocysts, able to discharge toxins after contact with other organisms. Main toxins are phospholipase A, porins, neurotoxic molecules, bioactive peptides, collagens, chitins and histamine-releasing factors.³ Clinically, the symptoms of envenomation are widely

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Jellyfish sting can cause severe envenomation syndrome but serious muscular involvement has been rarely reported, especially in the Mediterranean Sea. Muscular symptoms can be very challenging and may mimic inflammatory conditions such as idiopathic inflammatory myopathies (IIM).

WHAT THIS STUDY ADDS

⇒ We report the first case of rhabdomyolysis following jellyfish envenomation in a 17-year-old man. The diagnostic work-up included the exclusion of all other possible causes of myopathy, particularly IIM.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The patient was treated with hydration and high-dose steroids with progressive improvement of his clinical condition. Health professionals, including rheumatologists, should be aware of the presence in the Mediterranean area of venomous jellyfish whose toxins can determine severe muscle damage closely resembling autoimmune myopathies.

variable, ranging from isolated skin reaction with pain, swelling, redness and burning to severe systemic involvement, which usually has a delayed onset, with vomiting, headache, muscle cramps, cardiac disturbance, anaphylaxis, renal failure, neurological impairment and death.⁴ No many reports described muscle involvement.

Importantly, the pathophysiological response to envenomation depends on the premorbid status of the patient, the venom dose and the consequent host immune response.⁵

Here, we report a case of severe rhabdomyolysis following a jellyfish sting in the Sicilian coastal area successfully treated with steroids and hydration.



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¹Rheumatology Unit, Department of Health Promotion, Mother and Child Care, Internal Medicine and Medical Specialties, University of Palermo, Palermo, Sicilia, Italy

²Department of Anaesthesia, Intensive Care and Emergency, University of Palermo, Palermo, Sicilia, Italy

³Pathology Section, Department of Health Promotion, Mother and Child Care, Internal Medicine and Medical Specialties, University of Palermo, Palermo, Sicilia, Italy

Correspondence to

Giuliana Guggino;
giuliana.guggino@unipa.it

CASE REPORT

We report the case of a 17-year-old man who was stung from a jellyfish while swimming in the Mediterranean Sea. The patient experienced an acute onset of muscular symptoms, with severe limb pain, functional impairment, dyspnoea and loss of consciousness. Advanced life support was immediately performed, the patient was intubated and admitted to the Intensive Care Unit (ICU) of the University Hospital of Palermo.

No significant previous medical history or drug allergy were recorded.

On examination, a linear reddish swollen mark on the right cheek was evidenced. The patient was dyspnoeic and dysphagic with a severe reduction in muscle strength in all muscle groups. On admission to the hospital, the patient was afebrile, blood pressure was 145/95 mm Hg, heart rate was regular at 80 beats per minute, respiratory function was poor because of a severe impairment of respiratory muscle function, as diagnosed by ICU anaesthesiologists, and invasive mechanical ventilation was required. Main respiratory parameters after intubation were as follows: pH 7.19, pCO₂ 73 mm Hg, paO₂ 235 mm Hg, FiO₂ 100%, HCO₃ 27.9 mmol/L; the negative respiratory force during the whole period of hospitalisation ranged between -15 and -25 cm H₂O. Initial blood test documented markedly increased levels of creatine kinase (CK) (>22 000 IU/L), myoglobin (Mb) 5550 µg/L, lactate dehydrogenase (LDH) 2388 IU/L, aspartate aminotransferase 3013 IU/L and alanine aminotransferase 4293 IU/L.

A rheumatological evaluation was requested in the suspicion of a severe form of juvenile idiopathic inflammatory myopathy. No typical skin lesions, joint involvement or interstitial lung disease were retrieved. Muscle test confirmed a severe muscle dysfunction (Manual Muscle testing (MMT8) 40/80). Antinuclear antibodies (ANA) and extractable nuclear antigen antibodies (ENA), including specific and associated myositis autoantibodies panel, were negative. The genetics for muscular disorders was negative.

Lower limb magnetic resonance imaging (MRI) showed intense diffuse muscle oedema involving asymmetrically gluteal muscles, hamstrings and quadriceps (figure 1A–C) with a concomitant muscle hypotrophy of thighs and legs.

A muscle biopsy of the right vastus medialis was performed with the evidence of significant oedema and disruption of myofibers architecture, vacuolar degeneration and no signs of inflammatory cell infiltration, compatible with rhabdomyolysis (figure 1D).

The tests performed, coupled with the specific clinical picture and the ruling out of all other causes of severe muscle damage, allowed the final diagnosis of envenomation myopathy.

Standard treatment of rhabdomyolysis, mainly consisting in hydration, was not effective in controlling muscle damage, as evidenced by persistent increase in CK, Mb and LDH coupled with a severe increase in inflammatory parameters. Subsequently, we decided to implement treatment by adding intravenous methylprednisolone pulses (1 g/

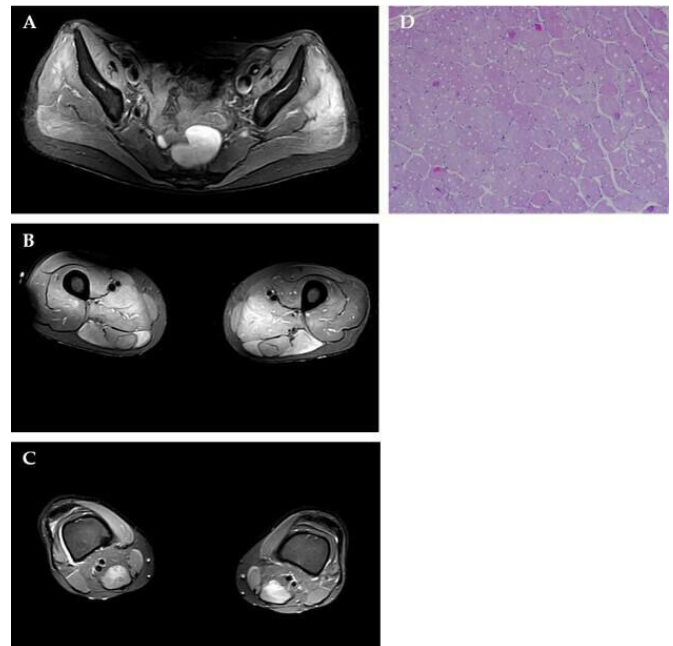


Figure 1 Evidence of muscle damage at both imaging and histology levels (A–C.) Lower limbs muscle MRI showed diffuse muscle oedema on STIR sequences involving the medius gluteus (A), the quadriceps (B) and the hamstrings (B and C). (D) Histological findings demonstrating vacuolisation, disruption of myofibers architecture in the absence of immune cells infiltration, H&E stain, original magnification 10×. STIR: Short-TI Inversion Recovery.

die) per 3 days, followed by oral prednisone 1 mg/kg/die in progressive tapering and life support, through ventilation, hydration and physical therapy. The patient experienced a progressive normalisation of blood tests (table 1). He was discharged in discrete clinical conditions and was admitted to a rehabilitation clinic where he is still undergoing physical therapy, slowly recovering muscle function.

DISCUSSION

To the best of our knowledge, we reported the first severe case of muscle toxicity caused by jellyfish envenomation in the Mediterranean Sea.

Our patient experienced a severe rhabdomyolysis that was investigated with imaging, histology and blood tests to define the diagnosis. The presence of a suggestive mark on his face and the onset of symptoms while swimming in coastal waters allowed to suspect a toxic syndrome from jellyfish. Specifically, we hypothesised *Physalia physalis*, also called Portuguese man o' war, to be the culprit as its presence has already been described in Mediterranean Sea and is renown to rarely cause toxic myopathy.

The systemic clinical picture related to *Physalia* sting is characterised by gastrointestinal symptoms, mainly presenting as vomiting, nausea and abdominal discomfort or pain.⁶ In severe forms, neurological and cardiorespiratory failure may occur, leading to fatal outcome or requiring hospitalisation in ICU,⁷ as reported in victims of *Physalia* in France.²

Table 1 Markers of muscle damage during hospitalisation following steroid administration

	Day 1	Day 2	Day 3	Day 4	Day 5	Reference values
CK	>22.000	11.000	3560	1704	230	39–308 IU/L
Mb	5550	1443	688	365	70	<72 µg/L
LDH	2388	1257	831	249	58	50–250 IU/L
AST	3013	1985	785	371	40	0–50 IU/L
ALT	4293	2302	812	155	33	0–50 IU/L

ALT, alanine aminotransferase; AST, aspartate aminotransferase; CK, creatine kinase; LDH, lactate dehydrogenase; Mb, myoglobin.

Muscular symptoms are common and usually present as myalgias and cramps. However, some previous reports on rhabdomyolysis from *Physalia* envenomation have been published. Victims were two young Australians who experienced a severe increase in CK, which reached 68 900 IU/L and 10 000 IU/L, respectively, accompanied by transaminitis on liver function testing.^{8,9} One patient suffered from a concomitant acute kidney injury, probably because of delay in administering intravenous fluid. In both cases, no data on MRI imaging or histology are available and the clinical syndrome was not characterised by the aggressive muscle damage that our patient experienced with dyspnoea and dysphagia and rapid reduction of muscular trophism all over his body. In addition, differently from the two cited reports, we treated our patient with steroids that seemed to contribute to the resolution of the acute toxidrome, as previously described.¹⁰

Up to date, no clear-cut guidelines define standard therapeutic interventions for jellyfish envenomation. This is mainly due to the high variety of toxins and clinical presentations of symptoms. Few randomised controlled trials have tried to address the question about treatment of stings without convincing results.¹ Only analgesics, baking soda, hot water, ice packs and topical vinegar, the latter just for specific species of jellyfish, seem to be universally accepted to manage jellyfish sting.¹¹ In addition, a cream containing an aqueous solution of 20% aluminium sulphate and 1.1% surfactant is reported as effective in preventing nematocysts from firing.¹² Importantly, swimmers should be educated on jellyfish risk and the use of protective equipment encouraged.

We decided to treat our patient with high-dose steroids because standard treatments failed to control muscle damage. In literature, some evidence account for a possible positive therapeutic role of steroids in severe, refractory forms of rhabdomyolysis due to different causes.^{13–15} Moreover, it has been proposed that muscle damage in rhabdomyolysis is associated with an inflammatory condition that can then justify the effectiveness of steroids.

To sum up, our report emphasises the importance of acquiring awareness on the presence of venomous

jellyfish in the Mediterranean Sea. Although the jellyfish was not directly visualised in our case, the skin presentation, the season and the toxidrome, including MRI and histology findings, in the absence of any other potential myopathic disorder, were suggestive of *Physalia* envenomation. Rheumatologists working in at-risk areas should be aware of such toxic myopathies as they could mimic inflammatory idiopathic myopathies.

The early identification of rhabdomyolysis as a consequence of jellyfish sting and its rapid treatment are of foremost importance to prevent severe complications.

Contributors GB and CR planned and wrote the manuscript. GB, CR and AF followed the clinical case, collected data and performed a literature search. LLB, FC and GG collected and critically revised data. AMF and BMG performed histology and tissue analysis. All authors read and approved the final version of the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Consent obtained from parent(s)/guardian(s).

Provenance and peer review Not commissioned; externally peer reviewed.

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ORCID iD

Giuliana Guggino <http://orcid.org/0000-0003-2479-6958>

REFERENCES

- Cegolon L, Heymann WC, Lange JH, *et al.* Jellyfish stings and their management: A review. *Mar Drugs* 2013;11:523–50.
- Labadie M, Aldabe B, Ong N, *et al.* Portuguese man-of-war (*Physalia Physalis*) Envenomation on the Aquitaine coast of France: an emerging health risk. *Clin Toxicol (Phila)* 2012;50:567–70.
- Tardent P. The Cnidarian Cnidocyte, a Hightech cellular weaponry. *BioEssays* 1995;17:351–62. 10.1002/bies.950170411 Available: <https://onlinelibrary.wiley.com/doi/10.1002/bies.950170411>
- Burnett JW. No title found. *Hydrobiologia* 2001;451:1–9.
- Burnett JW, Calton GJ. Jellyfish Envenomation syndromes updated. *Ann Emerg Med* 1987;16:1000–5.
- Burnett JW. Treatment of Atlantic Cnidarian Envenomations. *Toxicon* 2009;54:1201–5.
- Tibballs J. Australian venomous Jellyfish, Envenomation syndromes, toxins and therapy. *Toxicon* 2006;48:830–59.
- Rengel AC, Davel S, O'Connor S, *et al.* Rhabdomyolysis due to Jellyfish Envenomation in Western Australian waters. *Med J Aust* 2022;216:397–9.
- Maldonado E, Maillaud C, Barguil Y, *et al.* Rhabdomyolysis during Envenomation by *Physalia* SP Envenomation in New Caledonia. *Med Sante Trop* 2017;27:105–8.
- Sivanasworn NK, Anantham G, Jamal SM, *et al.* Managing an unidentified Jellyfish sting with mixed Envenomation syndrome at a Noncoastal hospital: is this a new form of Jellyfish Envenomation? *Wilderness & Environmental Medicine* 2023;34:225–30.
- Birsa LM, Verity PG, Lee RF. Evaluation of the effects of various chemicals on discharge of and pain caused by Jellyfish Nematocysts. *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology* 2010;151:426–30.
- Turner B, Sullivan P, Pennefather J. Disarming the Bluebottle treatment of *Physalia* Envenomation. *Med J Aust* 1980;2:394–5.
- Zarlasht F, Salehi M, Sattar A, *et al.* Short-term high-dose steroid therapy in a case of rhabdomyolysis refractory to intravenous fluids. *Am J Case Rep* 2017;18:1110–3.
- Antoon JW, Chakraborti C. Corticosteroids in the treatment of alcohol-induced rhabdomyolysis. *Mayo Clin Proc* 2011;86:1005–7.
- Sato K, Yoneda M, Hayashi K, *et al.* A steroid-responsive case of severe rhabdomyolysis associated with cytomegalovirus infection. *Rinsho Shinkeigaku* 2006;46:312–6.