Severe case of rhabdomyolysis following jellyfish envenomation in the Mediterranean Sea

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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. 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. 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. Clinically, the symptoms of envenomation are widely 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. 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.

Here, we report a case of severe rhabdomyolysis following a jellyfish sting in the Sicilian coastal area successfully treated with steroids and hydration.
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 dyspnoic and 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) 23881 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) 23/80). 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, vascular 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/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. In severe forms, neurological and cardiorespiratory failure may occur, leading to fatal outcome or requiring hospitalisation in ICU, as reported in victims of Physalia in France.

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-T1 Inversion Recovery.

Myositis

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 transaminisits on liver function testing. 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 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.

In both cases, no data on MRI imaging or histology are available and the clinical syndrome was not characterised. 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.

Table 1

<table>
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<th>Day 5</th>
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</table>

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

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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