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Cutaneous injuries from marine animals

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ABSTRACT

Cutaneous injuries by marine animals have a myriad of clinical presentations. Most require only symptomatic treatment, but some may be limb-threatening or even fatal. This is a report of three cases of marine animal injuries by a stingray, a sea anemone and a jellyfish, respectively, illustrating the potential severity of such injuries. The importance of early diagnosis is emphasised, with a discussion on the management of injuries from these three types of marine animals.

Keywords: cutaneous injuries, jellyfish venom, marine toxins, sea anemones, marine toxins

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INTRODUCTION

With increasing popularity of marine sports and leisure activities, clinicians in the outpatient settings are required to recognise and manage injuries from a wide variety of marine creatures. Many of these require only symptomatic treatment, but some may be limb-threatening or even fatal. We describe our recent experience with three patients who were injured by a stingray, a sea anemone and a jellyfish, respectively.

CASE REPORTS

Case 1

A 45-year-old man presented with a large ulcer on the right foot. He gave a history of wading in the shallow seawaters near an island in Brunei two weeks prior to presentation. He had felt a sharp piercing pain when he was strolling on the shallow seabed, with a water level of about 1.5 feet. When he came to the shore, he noticed a slit-like bleeding wound measuring 2 cm on the dorsum of the right foot. The foot swelled up within a few hours and the area around the wound became red and warm. There was associated pain and swelling of the right inguinal lymph nodes. He developed fever and chills six hours later. Upon presentation to a local hospital in Brunei, he was treated with analgesics, a tetanus toxoid injection and oral antibiotics. The slit-like wound and surrounding skin developed into a crust which fell off after several days, leaving a large, deep ulcer with an unhealthy base. Despite repeated dressings, the wound failed to heal.

On physical examination, he was noted to have an ulcer measuring 5 cm × 3 cm across and 1.5 cm deep on the dorsum of his right foot. The foot was oedematous and there was erythema around the ulcer. The base of the ulcer was covered with yellowish necrotic tissue. On irrigation with normal saline, a bony spine, measuring 11 mm by 2 mm was found embedded in the ulcer base (Fig. 1). This was gently removed and later identified

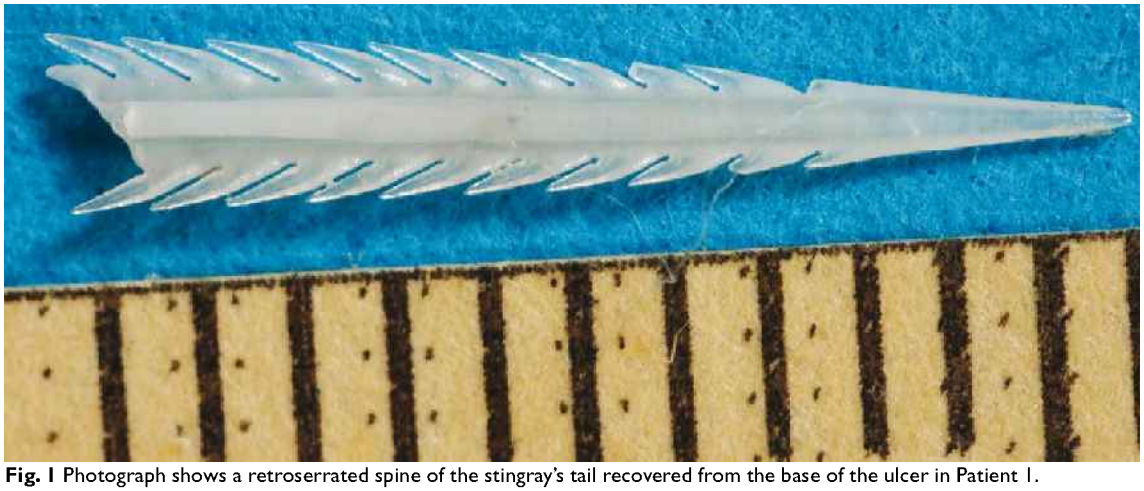

Fig. 1 Photograph shows a retroserrated spine of the stingray's tail recovered from the base of the ulcer in Patient 1.

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Fig. 2 Clinical photograph shows a slowly healing ulcer on the dorsum of the right foot of the patient with injury from a stingray.

Fig. 3 Clinical photograph shows that the ulcer seen in Fig. 2 had completely healed with scarring.

Fig. 4 Clinical photograph shows crusted plaques with eschar on the right leg of Patient 2 who had a sea anemone sting.

to be a calcified spine of a stingray. A wound swab taken from the ulcer base later revealed a mixed bacterial growth. The wound was dressed with calcium alginate and non-adherent adsorbent polyurethane dressings after wound toilet was done. The patient was given a seven-day course of oral amoxicillin with clavulanic acid. On inspection three days later, the swelling was reduced and the wound had improved (Fig. 2). However, it was not till four weeks later that the wound completely healed with a scar (Fig. 3).

Case 2

A 32-year-old man was referred two weeks after reportedly stung by a sea anemone while scuba diving in waters of Sulawesi. He had suffered linear abrasions on the right leg on the day of the injury, but these became inflammed and rapidly progressed. The entire right leg became red and swollen the following day. The injured area later became purulent. Despite a course of oral cefuroxime, cloxacillin, metronidazole and mefenamic acid prescribed by his general practitioner, the swelling and redness of his right leg persisted. A diagnosis of right leg cellulitis from possible sea anemone sting was made. The patient was afebrile, but his right leg was red and swollen with a crusted, cribriform plaque on the shin. His right inguinal lymph nodes were enlarged and tender.

A full blood count done was, however, normal and deep vein thrombosis was excluded on Doppler ultrasonography of the right leg. He was started on

Fig. 5 Clinical photograph shows inflammed linear superficial ulcers with overlying crusts on the left forearm of Patient 3.

oral amoxicillin with clavulanic acid, ciprofloxacin and doxycycline. Tetanus toxoid was also administered. In a review one week later, his condition had not improved. Intravenous clindamycin and oral ciprofloxacin were commenced. Pyogenic, mycobacterial and fungal tissue cultures from the wound were negative. A skin biopsy showed a chronic ulcer with secondary vasculitis. Improvement was made with the latter combination of antibiotics, and he was later discharged on the oral antibiotics. On follow-up examination, the crusted plaque was replaced by an eschar (Fig. 4).

Case 3

While swimming 20 metres from the shore of a local island, a 27-year-old man felt a burning pain on his left forearm. The forearm became swollen and red linear marks appeared within the next hour. He visited a general practitioner a few hours after the injury and received oral medications for pain relief. On examination, the patient was noted to have inflammed linear superficial ulcers with overlying crusts on his left forearm (Fig. 5). There was also generalised oedema of the affected forearm and arm. There was however no cyanosis of the fingers, the peripheral pulses of the limbs were all well felt, and the patient was afebrile. A diagnosis of jellyfish sting was made based on the history and clinical features. The patient was given anti-tetanus toxoid injection, an oral course of amoxicillin with clavulanic acid, loratadine and topical mupirocin ointment. The wounds were dressed with absorbent polyurethane dressing. On review nine days later, oedema of the affected limb was less and the wound was healing. A full blood count done on the day of review was normal.

DISCUSSION

Cutaneous injuries by marine animals have a myriad of clinical presentations, as there is a wide diversity of marine animals with the potential to cause injuries in man. Some of the common injuries include stings by jellyfish or sea anemones; envenomation by fish spines such as those of stingray, stonefish or catfish; and dermatitis caused by spiny creatures such as the sea urchin[1,2]. Direct injuries with tissue loss due to bites from larger fishes such as shark attacks are rare and invariably present to the surgical emergency department, not to an outpatient clinic. Physicians attending to cutaneous injuries by these common marine animals may be called upon to identify the marine animal, render the appropriate first aid or general measures, and provide treatment for the specific injuries.

Identifying the culpable marine animals requires a good history-taking, a thorough physical examination, and knowledge of the common species of dangerous marine animals around the region. Direct visualisation of the animal is often not possible as it is seldom brought to the clinician for inspection. Patients injured by stingray, for example, may not have even seen the animal during the injury. Stingrays, with their flat, diamond-shaped bodies, are not easily noticeable when they rest, half-hidden in the sands of the shallow waters. When disturbed or accidentally stumbled upon by the unwary beach-goer, the stingray will whip up its tail in defence before swimming away rapidly. Therefore, a strong history of wading in shallow waters known to be habitat to these rays, an immediate excruciating pain out of proportion to the observed injury, the presence of a puncture or laceration, usually on the dorsum of the feet, and discolouration of the wound margins with oedema few hours after injury, are clues to diagnosis[3]. Victims may also experience systemic symptoms such as hypotension, diaphoresis, vomiting or diarrhoea if envenomation is by the more dangerous species of the rays, e.g. members of the Dasyatid group, which are also known as true stingrays and have larger spines[4,5]. Confirmation of a stingray injury is sometimes made through recovery of the integumentary sheath with or without the retroserrated spine of the stingray's tail in the wound after careful examination or on radiography.

On the other hand, individuals injured by marine creatures equipped with nematocysts, such as the jellyfish or sea anemone, are usually unaware of the

sting until symptoms set in, which can be minutes later. Itch, burning pain, localised wheals or erythema, linear vesiculation or ulcers are possible presenting complaints[6]. Rarely, paralysis or fatal anaphylaxis follows injuries by more toxic subclasses of the coelenterates[7]. Box jellyfish, also known as "sea wasp", is one such example. It gives the most severe of all jellyfish stings and it is found in the regional Indo-Pacific waters of Indonesia, Malaysia, the Philippines and the Maldives Islands[8].

The initial treatment of any marine animal injuries should be aimed at ensuring the haemodynamic stability of the victim and at reducing pain. Anaphylaxis should be treated first and analgesics given. Anti-tetanus toxoid should always be administered to any victim without prior immunity. The venom apparatus of a stingray consists of the venom glands on the spine covered by the integumentary sheath. As the spine enters the victim, the sheath is broken, allowing the venom to enter the wound. The venom causes vasoconstriction and results in cyanosis and tissue necrosis. It is thus important to rinse the wound inflicted by a stingray thoroughly with fresh or salt water and remove any foreign body. This can be followed by submersion of the injured limb in non-scalding warm water (42°C–45°C) for pain relief. Local injection of lignocaine without adrenaline may ease persistent pain and allow exploration and debridement of necrotic wound. A radiograph is indicated to detect implanted spine of the ray's tail[3], as its early removal can prevent secondary infection, granulomatous tissue formation and a non-healing wound.

In jellyfish or sea anemone stings, appropriate first aid can prevent extensive tissue damage or death. As each nematocyst contains a spirally-coiled thread with a toxin-containing barb end that will uncoil and eject into the skin upon contact or change of ambient osmolarity, clinicians should advise patients not to scratch, rub or wash affected areas with freshwater. This will help to prevent activation of any remaining undischarged nematocysts on the skin, which would cause further tissue damage. Interventions such as the application of non-scalding heated salt water (42°C–45°C) or household vinegar (or 2%–10% acetic acid) can be used to inactivate the remaining unfired nematocysts[9]. Visible tentacles of jellyfish can then be removed using gloves or forceps and nematocysts can be scraped off using a blade after applying shaving cream or baking soda to the affected area[10]. Measures such as putting on a tourniquet over the affected limb of a child or person with exceptional hypersensitivity can be life-saving. However, one has to be careful not to cause limb ischaemia from prolonged constriction.

Majority of marine wound infections are self-limiting. *Staphlyococcus aureus* and *Streptococcus pyogenes* remained the common organisms responsible for infection of marine animal wounds[11]. This may be a result of traumatic introduction of the host's normal skin flora into the wound. Prophylactic antibiotics are usually not required in cases of injuries from jellyfish or sea anemone[10], or superficial wounds[3]. Antibiotics effective against marine bacteria should be prescribed in cases of an immunocompromised victim, a full-thickness wound or deep puncture, the presence of residual foreign body or when there is obvious evidence of secondary infection.

Outpatient broad spectrum antibiotics with coverage for the *Vibrio* species, *Aeromonas* species, *Mycobacterium marinum* and *Erysipelothrix rhusiopathiae* infections such as doxycycline 100 mg twice daily, ciprofloxacin 500 mg twice daily, cotrimoxazole 2 tablets twice daily, or tetracycline 500 mg four times a day are recommended[12]. A surgical referral should be sought for complicated puncture wounds, when surgical approach is needed to recover deeply-implanted foreign bodies, when the injury is in close proximity to joints, nerves or vessels, or in large wounds where healing by secondary intention is unlikely.

Injuries by marine animals are often a result of the animals' evolved protective mechanisms. While injury can be prevented in some instances by avoiding these creatures when they are spotted, most of the injured are caught unaware. Swimmers, surfers, snorklers, divers and fishing enthusiasts are among people who are most susceptible to such injuries. It is important for clinicians to be aware of such injuries and their management.

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