CHAPTER **36**

MANAGEMENT OF COMPLICATED ENVENOMATION FROM SEA URCHIN STING

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INTRODUCTION

Hospitals and clinical practices near large bodies of water will encounter podiatric cases that are unique due to the environment. Our program lies on the coast of the Atlantic Ocean, and receives a number of water-related emergency room cases. In South Florida, podiatrists must be prepared to handle not just abrasions and lacerations from interaction with the seafloor but also bites and stings from aquatic organisms. A very common chief compliant to our emergency room is the diver who receives a sting from the black sea urchin (diadema antillarum).

Out of 600 species of sea urchins, it is estimated that around 80 of them can be venomous to humans (1). Due to the black color of the spines and the dark habitats of these creatures, it is easy for this species to be stepped on accidentally. Their sting itself is not painful, however the spines are very brittle, and can shatter within the foot. The spines are barbed at their ends and release toxins from glands attached to the spines while in the foot (2). In the majority of cases, using vinegar soaks to dissolve the calcium carbonate-based spines are sufficient to alleviate the pain in the patient. If there are any spines still lodged within the skin, it is usually easy to remove them after the wound has been soaked in hot water (3). The toxin released from the spines can sometimes produce a hypersenstivity reaction, as we observed in our case.

CASE REPORT

On July 29th, a 37-year-old patient with an unremarkable past medical and surgical history presented to the Mercy Hospital Emergency Department with a foreign object lodged in the plantar aspect of the right foot. The patient reported he stepped on a sea urchin 3 days prior, and still had pieces of the stingers inside his foot (Figure 1).

The emergency department consulted with podiatry. Removal of the object was performed at the bedside under

Figure 1. Clinical appearance of the right foot at initial presentation.

Figure 2. Streaking erythema at the plantar-lateral aspect of the right foot.

local anesthetic. Local ultrasound confirmed that all objects were removed with no deep injury. The patient had no fever and showed no signs or symptoms of infection. The patient was discharged with prophylactic antibiotics (doxycycline 100 mg by mouth twice per day and trimethoprim/sulfamethoxazole 160 mg by mouth twice per day).

Two days later, the patient returned to the Mercy Hospital Emergency Department with noticeable ascending erythema to the plantar-lateral aspect of the right foot (Figure 2), and a large erythematous patch on the right medial thigh near the groin (Figure 3).

Both erythematous areas were connected by a streak ascending from the distal lateral foot to the proximal medial thigh. The patient reported intense itching in the erythematous areas, but denied fever or any other signs of infection. The patient was admitted and both the podiatry and infections disease departments were consulted. The infectious disease specialist placed the patient on intravenous vancomycin (1g every 12 hours) and intravenous levofloxacin (500 mg daily). Immediately after the first dose, the patient began to feel an intense and generalized itching, at which time the antibiotics were discontinued and diphenhydramine (25 mg) was given to the patient. Administration of the antihistamine stopped the patient's pruritis.

On August 1st, the status of the patient remained unchanged. Blood cultures were negative for any infection and all blood tests remained normal except for an elevated C-reactive protein level and elevated erythrocyte sedimentation rate. Magnetic resonance imaging was negative for cellulitis and negative for any remnants of foreign bodies in the right lower extremity. The infectious disease specialist placed the patient on intravenous piperacillin/tazobactam (3.375 mg every 8 hours) intravenous linezolid (600 mg every 12 hours) and intravenous dexamethasone (8 mg every 8 hours).

On August 2nd, the patient reported a significant improvement after only 3 doses of dexamethasone. The patient's erythema and pruritis began to subside. By August 3, even more dramatic improvement was noted. The clearly-defined borders of erythema dissipated, and the intense red-color became more pink. The streaks connecting the lateral foot with the medial thigh began to disappear. Dexamethasone was tapered to 8 mg every 12 hours, with no change in the antibiotics course. The patient continued to improve for the next two days (Figures 4, 5). The erythema continued to subside, and no more itching was reported. The patient was discharged on August 5th, was placed on oral linezolid (600 mg every 12 hours) for several days, and given instructions to follow-up with his podiatrist in 2 weeks.

DISCUSSION

Our case presentation demonstrates the complicated nature of traumatic cases involving aquatic animals. Tetracycline is one of the classes of antibiotics used to treat the classic vibrio and mycobacterium species infection associated with water trauma(4). The podiatric physician must also be cognizant of potential complications from envenomation and hypersensitivity reactions (5). The podiatric physicians

Figure 3. Erythematous patch on the right medial thigh.

Figure 4. Appearance of the right leg after administration of dexamethasone.

Figure 5. Appearance of right thigh after administration of dexamethasone.

who treated this patient were fully integrated into the medical team. They were among the voices that advocated treating this patient as both an infectious disease case and a hypersensitivity reaction case. Podiatry consulted with both the hospital's on-call marine biologist and toxicologist to better treat this patient before progression led to full-blown anaphylaxis.

We cannot rule out bacteremia as the cause of the dramatic erythema and pruritis in the patient. No definitive DNA analysis was performed to confirm the presence of any bacterial species. The dramatic effectiveness of dexamethasone in the patient to prevent progression of the patient's symptoms strongly suggests a hypersensitivity reaction was involved in this case versus bacteremia alone.

Sea urchin stings have been shown to cause both acute and delayed hypersensitivity reactions. Despite the hypersensitivity theories proven to cause such responses, their management usually involves a combination of both broad spectrum marine infection-related antibiotics like described above as well as short term high dose corticosteroid treatment. A case of severe eosinophilic pneumonia was linked to a 3-day-old sea urchin sting in an otherwise healthy 21-year-old male patient. The patient ended up being treated with broad spectrum antibiotics and methylprednisolone and the symptoms subsided within a 10-day period (6).

Furthermore, sea urchin stings have actually been associated with synovitis linked to pasteurella and mycobacterium marinum (7). Arthritis, sarcoidal type granuloma and or necrobiotic granulomas have also been linked to sea urchin stings for which either acute or delayed hypersensitivity reactions were the offered diagnosis (8).

There are been various treatments described for the short term management of sea urchin stings including hot candle wax, soaks of hot water mixed with white vinegar, salicylic acid paste, crushing of the spines in situ with a stone followed by bathing the area in fresh urine or even bolus injection of lidocaine leading to tissue tumescence helping in propulsion of spines or even a more recent use of laser leading to destruction of the spines without surrounding tissue necrosis as it matches the absorption peak of water.

In conclusion, it is very difficult to determine hypersensitivity when dealing with aquatic animal trauma. Our management started as a foreign body removal, and progressed to management of bacteremia and hypersensitivity reactions. Combination tactics improved the symptoms in our patient. The authors hope this case presentation demonstrates the benefit of treating those cases as both a hypersensitivity reaction and a bacteremia.

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