

Painfully Pretty

Q: As a new diver, I find sea urchins irresistible. I understand their punctures can be harmful. True?

A: True, but not all sea urchin-related injuries are equal. Many urchin species have large spines that are unlikely to penetrate skin. Even some with finer spines that can penetrate may not cause a big irritation. Some wounds can be serious, however. DAN referral physician Dr. Edgar Maeyens discusses the more painful aspects of sea urchin punctures.

Sea urchins are spiny creatures found in oceans the world over. The word 'urchin' is derived from Middle English (and in turn from Middle French) 'herichon,' meaning hedgehog — aptly named for the round, spiny creatures they resemble.

The urchin's globular shell is called the test. The average size of an adult is dependent on species (body size is different from spine/leg size, with little correlation), but the actual test can range from 2 to 4 inches (5 to 10 cm). The spines of some urchins can vary in length, with some of the longer species reaching up to 16 inches (41 cm), though most spines are much shorter.

Sea urchins are members of the phylum Echinodermata, which include sea cucumbers, crinoids, starfishes and brittle stars. The sea urchin moves by using its hundreds of tiny, transparent adhesive "tube feet."

The spines can move as well. Sea urchin spines possess an indented base, which fits like a ball-and-socket joint over a tubercle, a protuberance of the urchin's shell. Muscle fibers attached to the tubercle facilitate movement: when one spine is stimulated, neural innervation to surrounding spines allows them to move in concert.

All spines are covered by a thin layer of epithelium, or skin. Additionally, the spines can be hollow or solid; some have toxins associated with their epithelial layer. These toxic substances have been identified in sea urchins: histamine, serotonin, steroids, glycosides, cholinergics and bradykinin-like substances. All of these can cause an array of issues for the diver with a deep puncture, from mild pain, to swelling, to shock. Bradykinin in particular causes a great deal of pain.

Between the spines are structures called pedicellariae. These pedicellarines are tiny stinging structures that are used for defense and obtaining food. Also nestled between the spines are five double rows of tube feet with suckers that assist in locomotion, capturing food and grasping the sea floor. As with all echinoderms, sea urchins have no brain.

Urchins are the ultimate algae eaters in the ocean: they eat any type they can find. They will also eat plant and animal matter, including kelp, decaying organic matter, dead fish, sponges, barnacles and mussels.

Sea urchin punctures

If you prick yourself on an urchin, initially you'll feel only minor discomfort. Within 15-30 minutes, however, you may experience swelling, redness and aching. The pain can increase rapidly and last for several hours unless it's treated.

And watch those spines: because of their innate fragility, they frequently break, leaving pieces in the skin or deeper. Your body may resorb residual spines without surgical intervention. On occasion, spines can be spontaneously extruded from the skin. With repeated or numerous punctures, a delayed nodular skin reaction can occur. These nodules, which are firm to the touch, are either flesh-colored or slightly purplish.

Punctures to the small joints in the hands or feet can cause a unique complication called tenosynovitis. This inflammation of the joint tendons or the membranous lining of the joint space is the result of spinous material implanted directly into these tissues. Tenosynovitis can manifest early or occur several weeks later. If you suspect joint penetration, don't wait: since any delay in rectifying this can result in permanent joint damage, prompt medical attention is mandatory.

How does one recognize tenosynovitis? Outwardly, the joint becomes swollen, red and painful. Looking within the joint space, X-rays can see spine fragments.

Infrequently systemic reactions may occur: nausea, respiratory distress, muscle weakness, ataxia (inability to coordinate muscular movement), syncope (fainting) and paresthesias (pins and needle sensations), dyspnea (difficulty breathing), hypotension (low blood pressure), muscular weakness and even death.

A unique, delayed complication within the skin is the formation of granulomas (nodules). The most likely mechanism for these granulomatous lesions is a foreign body reaction to urchin remnants. This can include the epithelial spine covering; associated slime, sand, surface microbes (bacteria, algae); or spine fragments.

Treatment of punctures

- Treat pain by immersing the affected area in water up to 45°C (113°F) for 30-90 minutes. Repeat as necessary to control the pain and deactivate toxins.
- Use tweezers to remove any spines from the wound. Since the spines break easily, be gentle. This can be extremely difficult, and medical help, including local anesthesia, is usually required (Note: hot water should not be used after local anesthesia injection, as the lack of heat perception could cause a burn).
- Complete removal of all spines may be impossible, and X-ray may be required to find them.
- Clean the wound with soap and water followed by extensive flushing with fresh water.
- Leave any open wound open; do not close it with tape, as this will predispose the injury to infection.
- Follow up a week later with a doctor.
- If signs of infection or allergic reaction occur – pus, redness, or heat – apply topical antibiotics, such as a triple antibiotic ointment, and seek medical attention immediately.
- Monitor for allergic reaction and/or infection.
- Your physician will usually recommend oral antibiotics for infection. If infection develops, continue antibiotics for at least five days after all signs of infection have cleared. Your doctor will recommend the appropriate antibiotic. Get a tetanus booster if your tetanus vaccination is not up to date.
- Relieve pain with 1-2 tablets of extra strength acetaminophen (e.g., Tylenol® every four hours and/or 1-2 ibuprofen at a strength of 200 mg (e.g., Advil®, Motrin ®) every six to eight hours).

Prevention of Marine Animal Injuries

- Avoid contact with the animal: this sounds simple, but it may not be if you have poor buoyancy control and/or are experiencing conditions of poor visibility, currents, confined areas or other environmental limitations.
- Do not attempt to handle, tease, feed or annoy any marine animal. Exploring a crevice with your hand is a good way to receive an injury from a concealed animal defending itself.
- Strive to develop excellent buoyancy control and remain aware of what surrounds you.
- Do not allow a current to force you against a fixed object; it may be covered with marine

animals.

- Wear protective clothing.
- Make an effort to find out which animals you may encounter, and learn about their characteristics and habitats before you begin the dive. This will help you enjoy your dive more and prevent possible injury from the animals you interact with.

About the Author

Edgar Maeyens Jr., M.D., is a board-certified dermatologist, dermatopathologist and dermatologic surgeon and is frequently consulted by divers, marine biologists and world travelers to address illnesses and conditions specific to marine hazards and remote travel.

Got Training?

Would you know how to best help a diver buddy who was injured by a marine creature? Take DAN's [First Aid for Hazardous Marine Life Injuries course](#) for a thorough and interesting foray into the treatment of such injuries.