Effective Removal of Urchin Spines with Erbium: YAG Laser Ablation:
Report of a Case

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In recent years, with the growing popularity of nautical sports, marine medicine becomes increasingly important. The most commonly associated cutaneous diseases are the sun burn and the tanning. The other aquatic dermatology includes water-induced pruritus, pain, eruptions, and contact dermatitis. Injuries by jellyfish stings, venomous fish, sponges, and coral are not uncommon. However, sea urchin sting is relatively rare, and the therapy is often difficult. We report a case of sea urchin-sting successfully treated with erbium: YAG laser ablation. (Dermatol Sinica 22: 134-137, 2004)

Key words: Sea urchin, Erbium: YAG laser

INTRODUCTION

In the seas, there are a number of hazards to human from marine animals. Not only the vertebrate animals but also the invertebrate animals are dangerous to human. Among the marine invertebrates, hazards to man may arise from the effects of protozoans, sponges, coelenteraeas, sea worms, echinoderms, as well as other groups. These effects are due to toxins, injected venoms, or direct trauma, with superimposed...
infection, or more complex physical and chemical actions. Some of the injuries are minor, while others may be severe and even lethal. We report a case of extensive sea urchin stings which was effectively removed with erbium: YAG laser ablation.

CASE REPORT

A 44-year-old Taiwanese man, while on vacation in Phuket, Thailand and accidentally stepped the right foot on the sea urchin on beach on Feb. 2, 2003. Immediate pain and flu-like toxic syndrome occurred. The application of ammonia compresses and freshly-voided urine were recommended by the local people. He also pounded the wound with a glass bottle and attempted to remove the spines mechanically but in vain. The spines are very fragile and are very difficult to be extracted entirely, as they are likely to break off at the surface of skin. The stinging sensation bothered him when he stepped on the ground. He went to our outpatient department on Feb. 11, 2003 for persistent local tenderness and inability to walk well. Multiple black spines were found in the sole of right foot. (Fig. 1A).

We used the Continuum Biomedical Erbium/2.94 Erbium: YAG laser (spot size 2.0 mm, 300 mJ, fluence 9.55 J/cm², repetition rate 4 Hz) to remove the foreign materials. The patient was treated under an aseptic condition without local anaesthesia. The pain during the treatment was tolerated by the patient. The foreign bodies were destroyed until the black spots became invisible by the naked eyes, leaving circumscribed crater lesions with tiny pinpoint bleeding. After operation, an antiseptic wound dressing was applied with immediate pain relief. Two 2-mm skin punch biopsies were done and showed the spines penetrating into the deep dermis grossly. Histological examination revealed mild perivascular and periadnexal lymphocytic infiltration. Two weeks after the initial treatment, the wounds were already re-epithelialized. However, there were still some stinging points when he stepped on the ground. He circled these points with marking pen and another session of treatment was performed in order to remove all the residual spines. Two weeks after the second session, the final session was performed due to the same reason. The wounds were re-epithelialized without any discomfort within two weeks after the final treatment and scars were not found four weeks after the final treatment. During two months follow-up, no

![Fig. 1A](image1A)

Multiple black spines (white arrows) were found in the sole of right foot.

![Fig. 1B](image1B)

The lesions resolved completely without leaving any scar and granulomatous reaction.
delayed granulomatous, foreign-body reactions or other complications have been observed (Fig. 1B).

**DISCUSSION**

Sea urchins are marine invertebrates that belong to the phylum *Echinodermata*, class *Echinoidea*, characterized by a calcarious skeleton covered by spines and pedicellariae.\(^1\)\(^2\) The mouth consists of a complex arrangement of muscles and plates surrounding the circular opening. The anus is located on the upper surface. Depending on the species, movable spines of various sizes and forms are attached to the body. These spines often are sharp, pointed and in some cases even venomous. Their spines consist of calcium carbonate crystals covered by a layer of epithelium.\(^1\) (Fig. 2)

The most common species of sea urchin in Phuket, Thailand are *Echinothrix diadema* and *Mespilia globulus*. According to the patient's statement, the sea urchin he stepped on is *Echinothrix diadema* (Fig. 3). Its black spines are long, thin, hollow and very fragile. In Taiwan, the sea urchins that most commonly injure people include the family *Diadematidae* and *Echinometridae*. *Echinothrix calamaris* and *Diadema setosum* belong to the family *Diadematidae*. *Echinostrephus aciculatus* and *Anthocidaris crassiapina* belong to the family *Echinometridae*.

Injury from sea urchins usually results from inadvertently coming in contact with the spines.\(^4\) Injuries from sea-urchins result from penetration of the spines into the dermis or subcutis, leading to pain for several days. Complications of sea urchin stings include local inflammation, infection and delayed granulomatous foreign-body reactions which always develop weeks and months later.\(^5\)\(^6\) Long-lasting pain and even loss of function were ever reported.\(^5\)\(^7\) Systemic reactions to sea urchin injuries are relatively uncommon but have been reported from contact with some of the poisonous species.\(^4\) Sea urchin stings may also induce the massive keloids.\(^8\)

In order to prevent the long-term complications of the sea urchin stings, therapies may be indicated. At present, there are no uniformly accepted successful treatments because the spines of sea urchin are often difficult to remove owing to their easily breaking.\(^4\) Some sea urchin spines are quite rough and impossible to pull out.\(^4\) Anecdotal effective treatment includes pounding the wound side with a stone for the purpose of breaking up the spines into smaller fragments, which are more easily absorbed.\(^7\) The application of ammonia compress or freshly-voided urine has also been recommended.\(^4\) In this patient, he had tried the previously stated therapies; however, the result was not satisfacto-
ry. Other treatment that had been mentioned includes the application of salicylic-acid paste. Immersion in hot water (110 °F - 115 °F) mixed 1:1 with vinegar is suggested in the initial stage. The hot water inactivates the toxin and provides prompt pain relief. Roentgenograms with soft tissue windows may be needed to identify and locate retained spines. Wound infection is common and, if present, should be treated with antibiotics such as ciprofloxacin. Tetanus prophylaxis should be considered. The spines were ever reported to be safely extruded by propulsion initiated by the lidocaine tumescence. Deeply embedded spines, particularly when they have resulted in the formation of a granulomatous lesion, require excision. These injuries may be quite severe and require extensive surgery to correct.

Because our patient had failed in the previous treatments and the sole is usually not prone to scar formation, erbium: YAG laser ablation was used in this case, as has been reported in one case. The treated lesions left tiny pinpoint areas of bleeding and the amount of bleeding was acceptable. After all three treatment sessions, the lesions healed within 2 weeks and no scar tissues were noted.

With the increasing aquatic activities, sea urchin stings may be encountered more commonly. Erbium: YAG laser ablation offers an effective treatment to remove the spines. Immediate pain relief can be achieved and long-term complication can be prevented.

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REFERENCES