

## Venomous fish sting cases reported to Hong Kong Poison Information Centre: a three-year retrospective study on epidemiology and management

香港中毒諮詢中心被毒魚刺傷的個案報告：一個三年期流行病學及處理的回顧性研究

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**Objective:** To study the epidemiology of venomous fish sting injuries, management and clinical outcomes of injured patients reported to the Hong Kong Poison Information Centre (HKPIC). **Methods:** All venomous fish sting cases reported to HKPIC from July 2005 to June 2008 were retrieved from its database (DATOX) and the Hong Kong Hospital Authority (HA) Electronic Patient Record (ePR) computer system for analysis. **Results:** There were a total of 33 fish sting cases in this study. The average age of the patients was 43 years (range 20 to 84) and 24 patients were males. Most cases were injured by catfish (n=12), followed by stonefish (n=7) and lionfish (n=4). Ten cases sustained fish sting injury whilst at work. Five patients developed fish sting complications including cellulitis, subacute tenosynovitis, abscess formation and foreign body retention. No mortality was recorded. Within 7 cases of stonefish injury, 3 cases were classified as moderate effect outcome. Two patients received stonefish antivenom and none developed anaphylaxis. **Conclusion:** The majority of marine envenomations did not result in significant morbidity and required only supportive management. However, stonefish injuries might be associated with an increased risk of severe local symptoms which therefore required aggressive treatment including antivenom. (*Hong Kong j.emerg.med.* 2010;17:40-44)

**目的：**研究向香港中毒諮詢中心匯報，被毒魚刺傷病人的傷勢、處理及臨床結果之流行病學。**方法：**從2005年7月至2008年6月所有向香港中毒諮詢中心匯報的毒魚刺傷個案資料，從其數據庫及香港醫院管理局的電子病人記錄電腦系統尋回作分析。**結果：**本研究共有33個被魚刺傷的個案。病人平均年齡為43歲（範圍20-84），24名為男性。大多數刺傷個案為鯰魚（12名），接著為石頭魚（7名）及獅子魚（4名）。10個案在工作時被魚刺傷。5名病人出現被魚刺傷後的併發症，包括蜂窩織炎、亞急性腱鞘炎、形成膿瘡及留下異物。沒有死亡記錄。7個石頭魚刺傷個案中，3個個案分類為有中度影響的後果。兩名病人接受石頭魚抗毒液素而沒有出現過敏症。**結論：**大部份海洋中毒不會引致嚴重病症及只需要支援性治理。然而，被石頭魚所傷，可以增加嚴重局部症狀的風險，所以需要包括抗毒液素的積極治療。

**Keywords:** Bites and stings, epidemiology, fish venoms

**關鍵詞：**咬傷及刺傷、流行病學、魚毒液

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## Introduction

In Hong Kong, marine stings and envenomations are not uncommon because people have plenty of opportunities to encounter a wide variety of marine fish during food handling, fishing and diving. Common venomous fish stings that require medical treatment include injuries by catfish, scorpionfish (stonefish, lionfish, and waspfish) and stingray.<sup>1</sup> Although most of them run a benign clinical course, there is still a certain risk of severe local and systemic toxicity, particularly in stonefish envenomation.<sup>2</sup>

This study was a 3-year retrospective review on venomous fish sting cases reported to the Hong Kong Poison Information Centre (HKPIC). The epidemiology and clinical effects of venomous fish stings were described. Patients' management, outcome and injury complications were also reviewed.

## Methods

Reported cases of venomous fish stings to HKPIC from July 2005 to June 2008 were included in the study. The cases were retrieved from the HKPIC database, namely, "DATOX" with the coding of "bite/sting/

envenomation". Information in "DATOX" such as patient demographic data, poison data, management and patient outcome was collected from medical records through the Hong Kong Hospital Authority (HA) Electronic Patient Record (ePR) computer system, consulting health care professionals and other relevant sources.

The classification of types of fish sting injuries was based on the patient's history or identification of offending fish if available. Patient outcome was classified into five categories: death, major effect, moderate effect, minor effect and no effect, with reference to the American Association of Poison Control Centers Toxic Exposure Surveillance System (AAPCC TESS) definitions. Medical outcome categories are shown in Table 1.

## Results

There were 33 venomous fish sting cases included in this study. The mean age of patients was 43 years (range 20-84). Twenty-four patients (73%) were males. Out of the 33 cases, twelve were confirmed to be stung by catfish (*Plotosus lineatus*), 7 by stonefish (*Synanceia verrucosa*) and 4 by lionfish (*Pterois volitans*). The

**Table 1.** American Association of Poison Control Centers Toxic Exposure Surveillance System (AAPCC TESS) medical outcome categories

Medical outcome	Definition
No effect	The patient developed no signs or symptoms as a result of the exposure
Mild effect	The patient developed some signs or symptoms as a result of the exposure, but they were minimally bothersome and generally resolved rapidly with no residual disability or disfigurement A minor effect is often limited to the skin or mucous membranes
Moderate effect	The patient exhibited signs or symptoms as a result of the exposure that were more pronounced, more prolonged, or more systemic in nature than minor symptoms Usually, some form of treatment is indicated Symptoms were not life-threatening, and the patient had no residual disability or disfigurement
Major effect	The patient exhibited signs or symptoms as a result of the exposure that were life-threatening or resulted in significant residual disability or disfigurement
Death	The patient died as a result of the exposure or as a direct complication of the exposure

remaining cases included stingrays (*Taeniura meyeni*), waspfish (*Hypodytes rubripinnis*), rabbitfish (*Siganus canaliculatus*), silver scat (*Selenotocota multifasciata*) and other unknown fish. Ten cases sustained fish sting whilst at work (Table 2).

Most patients were stung on the hands (n=30). All patients complained of pain at the sting site. Other presenting symptoms were also common, for example, wound swelling (n=28), erythema (n=13) and numbness (n=13). No systemic symptom was present in our patients.

In terms of complications, there were 3 cases of cellulitis, 1 case of subacute tenosynovitis and 1 case of abscess formation over the sting area. All of them required admission to hospital for parenteral antibiotic treatment. There was also 1 case of retained catfish spine shown on plain radiograph.

Hot water immersion was the most common acute management for venomous fish sting and was adopted in 25 patients (76%) in the accident and emergency department (AED). Twelve patients (36%) and 11 patients (33%) received parenteral and oral analgesic for wound pain relief respectively. Digital nerve block was performed in 1 case. Thirty-two patients were

prescribed a single antibiotic or combinations of antibiotics. Ciprofloxacin (n=19) was the most commonly used antibiotic; followed by amoxicillin/clavulanate (n=13). Only 1 patient required incision and drainage as a result of abscess formation.

There was no mortality in our study. Eight cases were classified as moderate-effect outcome. Within the 7 reported cases of stonefish injuries, 3 patients got moderate-effect outcome and 2 patients received one vial (2000 units) of stonefish antivenom when severe local symptoms failed to be relieved by conservative treatment. Both of them responded to antivenom and did not develop anaphylaxis (such as urticaria, bronchospasm or shock) or delayed serum sickness. One of the patients with moderate outcome sustained stonefish sting over the finger while he was on duty. Severe local swelling and pain developed over the injury site and spread rapidly to the wrist level. He received stonefish antivenom and was admitted to the intensive care unit (ICU) for close monitoring. The patient's condition remained stable and the swelling and pain gradually improved. He was transferred to the medical ward for further management after one day of ICU care. The characteristics, complication and outcome of different fish sting injuries are shown in Table 2.

**Table 2.** Characteristics, complication and outcome of different fish sting injuries

Fish type	No. of cases	Work relation	Complication (No.)	Outcome (No.)
Catfish	12	15%	Foreign body with cellulitis (1)	Moderate effect (1) Mild effect (11)
Stonefish	7	86%	–	Moderate effect (3) Mild effect (4)
Lionfish	4	25%	–	All mild effect
Stingray	2	0%	–	All mild effect
Waspfish	2	0%	Cellulitis (1)	Moderate effect (1) Mild effect (1)
Rabbitfish	2	0%	–	All mild effect
Silver scat	1	0%	–	All mild effect
Unknown	3	33%	Subacute tenosynovitis (1) Cellulitis (1) Abscess (1)	Moderate effect (3)

## Discussion

Fish venoms are usually mixtures of heat-labile high molecular weight proteins with systemic toxic effect and low molecular weight amines which cause inflammatory reactions. The primary treatment of venomous fish sting is to inactivate the heat-labile venom by immersing the injured body parts in hot water<sup>3</sup> (about 42°C) for 30-90 minutes. In our study, there were 25 cases (76%) treated with hot water immersion in the AED.

Envenomed fish sting wounds must be followed up closely due to the risk of serious infection. The most common marine pathogens are facultative anaerobic Gram-negative bacteria such as *Vibrio vulnificus*. Infection should be promptly treated with an antibiotic that covers *Vibrio* species.

Plain radiographs of the injured site for fish stings are required for suspected embedded foreign bodies. In cases of cartilaginous fish such as stingray and catfish,<sup>4</sup> ultrasound and even magnetic resonance imaging may be indicated to detect the cartilaginous parts.

The most common venomous fish sting in our study was catfish sting. Oriental catfish is a food source and can be commonly captured in Hong Kong. Envenomation normally occurs during fishing or preparation for cooking. The sting can cause severe local pain and numbness spreading proximally. The intense local symptoms urge the injured person to seek immediate medical attention, contributing to the fact that it is the most commonly reported fish sting in our series.

Stonefish was the second most commonly involved venomous fish in our study. It has 13 pairs of strong and short dorsal spines with distally located venom glands which enable them to deliver a relatively large dose of venom.<sup>5</sup> Envenomation usually occurs in food handlers during transfer or cooking. Work-related sting injury ranked highest in the stonefish group in our study and was over 85% (6/7 cases).

Stonefish sting causes immediate onset of extreme pain that peaks at 60-90 minutes and lasts for 12 hours. Severity increases with the number of stings. Gross swelling, cellulitis and necrotising fasciitis<sup>6</sup> may occur. Systemic envenomation can lead to motor paralysis, paralytic respiratory depression, hypotension and even cardiac arrest.<sup>7</sup>

Antivenom is available for stonefish sting in Hong Kong. It is a horse anti-stonefish toxin immunoglobulin-G with clearly established efficacy for analgesia and diminution of tissue damage due to stonefish toxin. It is indicated for envenomation by stonefish with significant local pain or presence of systemic symptoms.<sup>8</sup> The dose depends on the number of stings and is the same for adult and children. It is given intramuscularly and can be repeated when necessary. In case of severe systemic envenomation, it can be diluted and infused intravenously.<sup>7</sup>

The retrospective nature of this study limited the clinical information available from the attendance record and discharge summary. For example, the type of occupation in work-related cases, the intervals between injury and hospital presentation and the effectiveness of treatment such as hot water immersion might not be recorded in the medical chart.

The present cohort of 33 cases may not be representative since this case review only included reported cases from regional hospitals and may be subjected to hospital bias. Another limitation of this study is under-reporting. Many fish handlers with fish sting injuries might not present to the AED unless the condition was severe, e.g. stonefish sting. However, it is worthwhile to deliver a message to the public and patients about the potential toxicity and complication of venomous fish sting. A summary of toxicity and clinical features of different fish stings is illustrated in Table 3.<sup>9-12</sup>

We advise fish handlers to wear proper gloves when they handle venomous fish and wear thick-soled

**Table 3.** Summary of toxicity and clinical features of different fish stings

Fish type	Fish venom	Clinical features
Catfish	Haemolytic, necrotic, inflammatory and vasoconstrictive factors; crinotoxin <sup>9</sup>	Severe local pain and numbness intensify with proximal spreading
Lionfish	Inflammatory mediators like prostaglandins and thromboxane <sup>10</sup>	Immediate sharp burning pain and swelling
Stingray	Phosphodiesterase, nucleotidase and serotonin <sup>11</sup>	Bluish or greyish discoloration around the wound; disproportionate pain; muscle cramp, weakness, seizure, hypotension, cardiovascular toxicity; deep wounds and lacerations
Stonefish	Verrucotoxin, stonustoxin; <sup>12</sup> norepinephrine, tryptophan and dopamine	Extreme pain, swelling, numbness; vomiting, diaphoresis, hypotension, syncope; cardiac arrhythmia, pulmonary oedema
Waspfish	Cytolytic proteins	Severe pain, swelling and erythema

shoes or heavy duty boots since fish spines can penetrate thin rubber gloves and shoes. They should be aware of venomous fishes especially stonefish and are advised to seek immediate medical care once stung.

## Summary

The two most common fish stings noted from AED were catfish and stonefish. All cases in the study were mild or moderate. The approach to all stings is generally the same i.e. hot water immersion, in order to relieve pain by inactivating the heat-labile venom. Other measures for wound treatment such as analgesic, tetanus prophylaxis and antibiotic prophylaxis should be considered. Complications consisting of cellulitis, tenosynovitis and foreign body retention as recorded in our study should be watched out for and managed accordingly.

Stonefish sting can be serious. Antivenom should be offered in case of uncontrolled pain, severe local reaction or systemic toxicity. Two patients received stonefish antivenom in our study and none of them developed anaphylaxis.

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