



## **PNG Snakebite Partnership**

### **Managing Stonefish Envenomation**

#### **1. Stonefish**

Stonefish (*Synanceia* spp.), members of the Scorpaenidae family, are among the most venomous fish in the world. These well-camouflaged fish inhabit shallow Indo-Pacific waters. Stonefish possess up to 15 dorsal spines capable of injecting venom, which can cause severe pain and systemic symptoms. The severity of envenomation depends on the number of spines involved and the depth of penetration. Although potentially lethal, research on stonefish venom remains limited **【1】** .

Key venom components include:

- Stonustoxin (SNTX): Causes hypotension, muscle paralysis, and necrosis
- Verrucotoxin (VTX): Hemolytic and cytotoxic, contributes to inflammation and respiratory failure
- Trachynilysin (TLY): Disrupts cell membranes, leading to necrosis
- Cardioleputin: Affects heart rhythm and blood pressure



Stonefish venom is injected through needle-like dorsal spines when the stonefish is stepped on or handled. The amount of venom and depth of spine penetration influence symptom severity. Each spine may inject 5–10 mg of venom.



## 2. Clinical Features – Stages of Envenomation

Venom Type: Cardiotoxic & Neurotoxic

Cardiovascular Effects<sup>3</sup>:

Stonefish venom induces a biphasic blood pressure response, similar to other Scorpaenidae species:

- Initial hypertensive phase due to vasoconstriction
- Followed by hypotension due to vasodilation, potentially leading to cardiovascular collapse

Experimental studies using rat hearts and aortic rings show that the venom impacts both heart contractility and vascular tone. These effects are likely mediated via endothelial cells, triggering nitric oxide and other vasoactive compound release.

Neuromuscular Effects<sup>3</sup>:

Stonefish venom tested on chick nerve-muscle preparations inhibited muscle contractions.

- Toxins may block neuromuscular transmission, preventing nerve signals from reaching muscles
- The venom is also cytolytic, disrupting cell membranes and causing tissue damage

Symptoms in humans include:

- Excruciating pain at the sting site
- Swelling, puncture wounds with blue discolouration, and possible necrosis<sup>1,3</sup>
- Systemic effects: fever, nausea, vomiting, dizziness, muscle weakness, convulsions, heart failure, and respiratory distress<sup>1,3</sup>
- Long-term complications: persistent limb weakness and trophic disorders<sup>1</sup>
- Rare fatalities due to shock or systemic toxicity<sup>2</sup>

### 3. First Aid and Pre-hospital Care

#### Stonefish Stings:

- Immerse affected limb in hot water (<45°C for 20 min)
- Administer local anaesthetic
- Carefully remove spines
- Seek urgent medical care

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### 4. Psychological First Aid & Communication

#### Psychological first aid & patient communication

- Managing Patient Anxiety & Fear
  - Many victims experience panic due to paralysis or severe pain
  - Techniques for calming patients (reassurance, breathing exercises)
- Community Education:
  - Safe practices to prevent bites/stings (e.g., shuffle feet in shallow water)

### 5. Hospital Management

Most patients who sustain **stonefish spine punctures** will require antivenom for pain and swelling relief. **First aid** measures should be implemented per local guidelines before administering antivenom.<sup>4</sup>

#### Antivenom Dose and Administration

The initial dose is based on the number of visible puncture sites:

**No. of Punctures   No. of Vials   Units of Antivenom**

1 – 2	1	2,000 units
3 – 4	2	4,000 units
5 or more	3	6,000 units

Stonefish antivenom (**equine IgG Fab**) is used to treat envenomation from **stonefish found in Australian waters**. It may also be effective against stings from **bull trout, lionfish, and cobbler**.

**Indications:**

- Clinical signs of systemic envenomation (e.g., cardiac failure)
- Severe localised pain **unrelieved by IV opioids**

**Contraindications:**

- No absolute contraindications
- Increased risk of anaphylaxis in those previously treated with antivenom or allergic to **equine serum**

**Administration:**

- Administer in a monitored setting prepared for anaphylaxis
- Give **1 ampoule per 2 spine punctures**, up to 3 ampoules, **IM undiluted**
- Alternatively, **dilute 1 ampoule in 100 mL of 0.9% saline** and administer IV over 20 minutes
- Repeat doses may be given (1 ampoule at a time) until symptoms resolve
- **Discuss doses >3 ampoules with a toxicologist**
- If haemodynamically unstable or in cardiac arrest, use **rapid IV push**
- **Adult and paediatric doses are the same**

**Adverse Drug Reactions**

**Anaphylaxis:**

- Stop infusion, treat with oxygen, IV fluids, and IM adrenaline
- Restart when symptoms resolve; rarely, continuous adrenaline may be needed

**Serum Sickness:**

- Occurs 5–10 days post-antivenom
  - Symptoms: fever, rash, arthralgia, myalgia
  - Treat with oral steroids (e.g., **prednisolone 50 mg/day in adults, 1 mg/kg in children for 5 days**)
  - All patients receiving antivenom should be warned of this risk
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## 6. Additional Supportive Care

### Pain Management

- Administer local anaesthetics

### Wound Care

- Assess for retained spines (use ultrasound or X-ray if needed)
- Irrigate with saline and/or antiseptic

### Antibiotics

- Consider for deep wounds or signs of infection
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## 7. Complications & Long-Term Care

- Stonefish: Secondary infection, delayed wound healing
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## 8. Risk Factors

- High-risk groups: Fishermen, divers, and healthcare workers in coastal areas
  - Seasonal factors: Increased incidence during monsoon and fishing seasons
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## 9. Differential Diagnosis

- Sea Snake vs. Land Snake: Sea snake bites are often painless, with no visible fang marks
  - Stonefish vs. Other Fish: Stonefish cause more intense systemic symptoms
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## Emergency Contact

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## References

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