Clinical presentation and management of bites and stings from animals.

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Venom

VENOM IS PRODUCED BY ANIMALS IN A HIGHLY DEVELOPED SECRETORY ORGAN OR GROUP OF CELLS, AND WHICH IS DELIVERED DURING THE ACT OF BITING OR STINGING.
Toxin is defined as a substance that is derived from the tissues of a plant, animal or microorganism which has a deleterious effect on another plant or animal.
Venom components.

1. **Proteins**
2. **Peptides**
3. **Enzymes**
4. **Nucleic Acids**
TOXINS FROM VENOMS.

1. Neurotoxins
2. Cardiotoxins
3. Myotoxins
4. Haemolysins
5. Cytolysins
Bits and Stings

a) Bees, Wasps and Hornets

b) Scorpions and Spiders

c) Snake
Marine Creatures

a) Bites – Sea snake
   - Fish
   - Eel

b) Stings – Sea anemone
   - Sea urchin
   - Stone Fish
   - Sting ray
Clinical Features

- Local
  - Erythema
  - Papule
  - Blisters
  - Ulcers

- Systemic
SYSTEMIC SIGNS AND SYMPTOMS.

1. Neurotoxic
2. Cardiovascular toxic
3. Generalized myotoxictoxic
1. General Myotoxicity.

2. Local Myotoxicity
1. Myotoxicity.
3. Local necrosis.
4. Local tissue damage.
LOCAL TISSUE DAMAGE.

1. Myonecrosis
2. Haemorrhage
3. Dermonecrosis
C. rhodostoma
Bite marks

Bite marks with double punctures: 30 (75%) (Among 24 severe cases, 20 patients had two fang marks)
Local signs and symptoms in the patients bitten by *C. rhodostoma*

- Two fang marks (A)
- Blood from wound (B and C)
- Necrosis (D)
- Multiple blisters (C, D, E and F)
A typical symptoms of spontaneous systemic haemorrhage in case 31 bitten by *C. rhodostoma* with multiform haemorrhages in skin (petechia, ecchymoses and purpura). He suffered from severe bleeding at the site of bite and also at other parts of body. At that time of admission to hospital, no antivenom was available for treatment. Therefore, a massive amount of blood (37 units) was transfused to cure him.
T. albolabris
**LOCAL SYMPTOMS**

**Bite marks**

*Picture 3.35:* Bite marks of *T. albolabris*.

(A): Two punctures of fang marks in right dorsal foot (a head of black arrow) in case 97 with ecchymoses at the site of the bite.

(B): Blistering and bleeding at the site of the bite.

(C): Fangs of *T. albolabris*
Necrosis caused by *T. albolabris* in case 109 with delayed hospital (seven days after the bite). Surgery to remove necrosis and amputate the middle and ring fingers of his hand was carried out five days after admission.
Spontaneously systemic haemorrhage after *T. albolabris* bites. Swelling expanded after the bite in left hand (A and B) and haemorrhage into muscles and subcutaneous tissue at of right side of back (C).
N. kaouthia
Bite marks caused by *N. kaouthia* and relationship to systemic symptoms. (A) and (B) showed necrosis (arrows) at the site of bite in his right hand accompanied by respiratory failure (case 52); (D) and (E), the necrosis in early period (2 hrs after the bite) and clinical symptoms; tight ligature used in case 55 (C); and the bite by *N. kaouthia* (dead snake) and necrosis on the thumb in case 54 (F).
Severe neurotoxic envenomation occurred after *N. kaouthia* bites around 4 hours in case 47 (top) and case 49 (bottom). The site of bites (ahead of black arrows) showed the necrosis at the punctures of fangs.
N. siamensis
Local envenomation caused by *N. siamensis*: case 61 (A), case 66 (B, C), case 70 (F), case 68 (D) and case 69 (E)
Severe envenomation in patients bitten by *N. siamensis*: Unconsciousness in case 69 (A); acute renal failure in case 73 (B) and case 68 (E); necrosis, and infected blisters in 24-week pregnant woman (C); and swelling, myalgia and necrosis in case 72 (D)
Sac spider, *Cheiracanthium fulcatum*
Violin spider, *Loxosceles* sp.
Violin spider bite at 3 days.
Violin spider bite at 11 days
Violin spider bite at 14 days
Violin spider bite at 4 weeks
Ulceration and necrosis on the forearm of a patient following spider bite. The patient identified the spider as a wolf spider.
Hobo spider bit - local lesions may become deep and extensive, and may not heal for two to three years
Brown recluse spider
Blistering caused by the bite of a brown recluse spider

Necrosis or tissue death in early stages

Necrosis or tissue death in a later stage

Surgery removed dead tissue
Brown recluse spider bite
Progression of a brown recluse spider bite (Days 3 - 10)
Spider bite, brown recluse. View of healed wound approximately 10 months after bite.
Parabuthus granulatus
7-year-old child with severe hemolysis and renal failure in coma, 14 hours after triple sting injury from *H. lepturus*. Extensive damage to skin and subcutaneous tissues with development of ulcers, 4 days after sting accident with *H. lepturus*. 

**Hemiscorpius lepturus sting**
Honey bee

Hornet
Hospitalised after the hornet attack is Amy Swan, 10, with her mother Marie at NUH, her home for the last three weeks.

Hornet attacks leaves girl with 91 stings -

The Straits Times
This photo shows what a single hornet sting can do!
Patient stung in the face by bees
Bee Sting of Right Elbow
MARINE HAZARDS.

1. Venomous animals
2. Poisonous animals
3. Others Eg. Biting animals
Tentacular nematocysts of *Carukia barnesi*, for comparison
Note the "tentacle print" on the author's leg after touching the tentacles of a jellyfish.
Cutaneous manifestations following exposures to marine life. Jellyfish stings.
Fire coral filaments
Classic sting by fire coral on the wrist.
Sea Anemone, *Actinodendron plumosum*
Sea Anemone, *Actinodendron plumosum* sting
Cutaneous manifestations following exposures to marine life. Erysipeloid.
Cutaneous manifestations following exposures to marine life. Envenomation caused by Portuguese-man-of-war.
Typical skin reaction from Sea Bather's Eruption.
VENOMOUS FISHES.

1. Rays
2. Cat fishes
3. Scorpion fishes
4. Rabbit fishes
Stonefish sting
An aquarium worker who presented to the emergency department after sustaining a lionfish sting to his left hand.
Marine Toxins: General issues

- **Human Health Problems**
  - Envenomation
  - Sea food intoxications/Poisonings

- **Environmental Problems**
  - Morbidity/Mortality in marine biota
  - Food web interruption
  - Physico-Chemical manifestations
Toxins in Sea Food
(Exogenous Toxins)
# Marine Toxins and the associated poisonings in fin-fish

<table>
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<tr>
<th>The Disease</th>
<th>Toxins</th>
<th>Occurrence</th>
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<td>Ciguatera fish poisoning (CFP)</td>
<td>Ciguatoxin (CTX)</td>
<td>Tropical, subtropical</td>
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<td>Puffer fish (tetrodotoxin) poisoning (PFP)</td>
<td>Tetrodotoxin (TTX)</td>
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<td>Scombroid fish poisoning (SFP)</td>
<td>Scombrotoxin (STX)</td>
<td>World wide</td>
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Bioaccumulation of ciguatera toxin from algae to fish and human consumers
Ciguatera Causative Organisms

- Dinoflagellates
  - Single-celled
  - Motile
  - Pigmented
  - Photosynthetic

- *Gambierdiscus toxicus* as one etiological agent

- Toxins produced by the organism concentrate in the food chain
  - Accumulates in fish tissues
  - Not a fish pathogen

- Production of toxins not well understood
  - Role of biotransformation of ciguatoxin precursors in food chain
Ciguatera Fish Poisoning (CFP)

Examples of Fish that Have Been Known to Carry Ciguatoxins

- Black Grouper
- Blackfin Snapper
- Cubera Snapper
- Dog Snapper
- Barracuda
- Greater Amberjack
- King Mackerel
- Hogfish
- horse-eye jack
- Yellowfin Grouper
Ciguatera Food Poisoning Clinical Effects

- Symptoms usually develop within 12 hours
- Acute onset
- Gastrointestinal tract symptoms early
  - Pain, cramping, diarrhea, vomiting
  - Usually subside within 24-48 hours
- Neurological symptoms, signs
  - Headache
  - Temperature disturbance (hot-cold sensation reversal)
  - Tooth pain
  - Respiratory paralysis and seizures in severe cases
- Cardiovascular
  - Heart rhythm abnormalities
    - Rare, usually bradycardia
- Regional variation in signs and symptoms has been reported
Puffer fish (Tetrodotoxin) poisoning (PFP)

Toxin produced by members of the order Tetraodontiformes. The metabolic source of tetrodotoxin is uncertain.

- **Complex chemical structure**
  - Non-protein
  - Zwitterion
    - Carries positive and negative charge
  - Heat stable, but less than saxitoxin
  - TTX is unstable when heated to 100°C
    - Unstable in alkaline solutions
  - Found in fish skin, liver, ovary, intestine, possibly muscle
Food Poisoning from Tetrodotoxin

• Several animal species are toxigenic
  – Blue-ring ed octopus
  – Poison dart frogs
  – Oregon rough-skinned newt (*Tarichagranulosa*)

• Most common source is puffer fish
  – Fugu
  – Ichthyosarcotoxic
  – Ichthyootoxic
  – Role of bacteria in toxin production?
    • *Vibrio, Pseudomonas*
Scombroid Food Poisoning

- **Scombroidae fish**
  - Marine tuna
  - Mackerel
  - Skipjack

- **Nonscombroid fish**
  - Mahi Mahi
  - Amber Jack
  - Sardines, anchovies

- **Temperate and tropical waters**
  - California, Hawaii

- **A common and preventable cause of food-borne illness**

- **Ichthyosarcotoxictic**
TOXINS OF VENOMOUS ORIGIN
(Endogenous Toxins)

CONOTOXINS
Cone snail

C. amadis
Cone snail

Diagrammatic representation

- Venom duct
- Venom bulb
- Gut
- Siphon
- Esophagus
- Eye
- Nerve plexis
- Foot
- Radular teeth
- Radular sac
- Proboscis
Therapeutic utilities of conotoxins

Neuropathic pain, Parkinson’s disease, Schizophrenia, Alzheimer disease, Tourette’s syndrome, Demyelinating disease, Depression, Epilepsy, Stroke, Anxiety, Antihypertensive agents, Muscle relaxant, Ulcerative colitis, Blood Pressure regulation, Arrhythmia, Asthma and Cancer...

THANKS