

The EM Educator Series

The EM Educator Series: Snakebites w/ a focus on Crotalids

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Case 1:

A 24-year-old male presents with a snakebite to the left forearm. He is brought in by friends and is currently intoxicated. His friends think he tried to pick up a rattlesnake. The skin around the wound is dark and edematous.

Questions for Learners:

1. What are the types of venomous snakes?
2. How do crotalids and elapids differ?
3. What are important features of the history and exam for patients with snakebite?
4. What labs should be obtained in the patient with suspected venomous snakebite?
5. What is the management?
6. Who should receive CroFab? Why does controversy exist concerning this therapy?
7. Can compartment syndrome occur after snakebite?

Suggested Resources:

- Articles:
 - LIFTL – [Approach to Snakebite](#)
 - emDocs – [Management of Venomous Snakebites in North America](#)
 - LIFTL – [Toxicology Conundrum](#)
 - Tox and Hound – [Snakes! Why'd it have to be SNAKES?](#)
 - emDocs ToxCards – [Snakebite Compartments](#)
 - [WikEM](#)
- Journal Articles:
 - [Emergency Medicine Clinics of North America – North American Snake Envenomation](#)
- Textbooks:
 - [Goldfrank's Ch. 122](#)

Answers for Learners:

1. What are the types of venomous snakes?

2. How do crotalids and elapids differ?

- Crotaline (Pit Vipers) – deaf and poor eyesight → heat sensitive pit to localize
 - cottonmouths, water moccasins, and rattlesnakes
 - Triangular head, elliptical pupils, and two curved fangs
- Elapidae (Coral Snakes)
 - “red on yellow will kill a fellow, red on black venom lack”
 - As compared to crotaline venom, elapidae venom has no proteolytic activity and thus causes fewer local symptoms but does have a potent neurotoxic component.

3. What are important features of the history and exam for patients with snakebite?

It's important to obtain key information regarding the time of the bite, general description of the snake, and any of the patient's comorbid medical conditions, any history of prior bites (due to the possibility of cross-reactivity among venoms) and allergies, especially those to horse or sheep products.

As well as a thorough physical exam with initial attention to the ABCs, it is important to document circumferential measurements of the wound site every 15 to 30 minutes. This will guide your evaluation of the local progression of disease and need for additional antivenom.

4. What labs should be obtained in the patient with suspected venomous snakebite?

Diagnostic labs are important for the detection of systemic effects of snake venom and help differentiate the severity of the syndrome. Labs to obtain include a complete blood count, coagulation factors including fibrinogen, type and screen, creatinine kinase, urinalysis, and comprehensive metabolic profile. An ECG is also recommended to evaluate for cardiovascular effects.

Patients often demonstrate a leukocytosis and transaminitis, both of which resolve with antivenom treatment. Crotaline venom causes a consumptive coagulopathy that looks like DIC but is not associated with increased clotting because thrombin and factor XIII are not affected. Thrombocytopenia occurs from sequestration and direct venom effects as well as a prolonged prothrombin time (PT), activated partial-thromboplastin time (aPTT), low fibrinogen, and an elevated d-dimer.

Myonecrosis from the local wound leads to an elevated creatinine kinase and resulting myoglobin deposition can cause renal dysfunction. Thus the patient should be monitored for renal failure from hypotension, rhabdomyolysis, intravascular hemolysis or the nephrotoxic effects of the venom itself.

5. What is the management?

The poison control center should be contacted immediately. Tetanus should be administered to all snake bite patients. There is no indication for antibiotics if there is no sign of infection. Furthermore no controlled trials have demonstrated effective relief with H2 blockers or steroids.

The primary treatment for crotaline envenomation is antivenom with Crofab if indicated.

6. Who should receive CroFab? Why does controversy exist concerning this therapy?

The snakebite syndrome is traditionally categorized according to severity, which helps guide the administration of antivenom.

- Minimal: local confined to bite site, no systemic/no coagulopathy
- Moderate: progression of swelling beyond bite site, non-life threatening symptoms
- Severe: shock, severe local envenomation, coagulopathies

Antivenom should be administered to all patients with moderate to severe snake bite envenomation. In the past, preliminary skin testing and pretreat was recommended, however this is controversial. Earlier administration is theoretically superior because it binds the venom and may decrease the insult from the inflammatory cascade. Those administered antivenom should be monitored during and after the administration of antivenom and admitted to the ICU.

7. Can compartment syndrome occur after snakebite?

If a concern for compartment syndrome after pit viper envenomation exists, diagnosis can only be made through direct measurement of the compartment pressure or through calculation of a delta pressure measurement. Primary treatment of a true compartment syndrome is with antivenin. Only after failure of antivenin, in coordination with local poison control and surgical consultation, should fasciotomy be attempted in order to prevent end stage neurologic and tissue destruction in the limb.