

EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

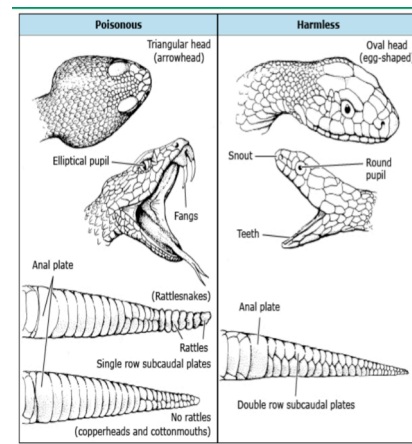
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Venomous Snake Bite

A 37-year-old male with no past medical history presents to the ED with progressive hand swelling for the past 2 hours. He was bit in the hand by a rattlesnake during an outside hike. He denies loss of consciousness, shortness of breath, or chest pain. Vitals show he is afebrile with tachycardia, tachypnea and mild hypotension. On physical exam, patient has two small sized puncture wounds on his left wrist surrounded by ecchymosis and edema. Review of systems is positive for nausea. Remainder of exam is within normal limits. Which of the following is the most appropriate initial treatment for this patient?

- A. Administer antivenom (Anavip) and provide IV fluids
- B. Administer antivenom (Anavip), provide IV fluids and perform incision and suction
- C. Administer antivenom (Anavip), provide IV fluids and prepare for surgical intervention with fasciotomy
- D. Administer antivenom (Anavip), provide IV fluids and apply pressure immobilization with a tourniquet
- E. Provide IV fluids and monitor vitals and clinical status for further management



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There are 6 species of venomous snakes in Florida, commonly grouped as: rattlesnakes, water moccasins (cottonmouth), and copperheads. They are members of the family Viperidae, subfamily Crotalinae (commonly called "pit vipers"). Approximately 5000 snake bites are reported to the American Association of Poison Control Centers annually. Most bites occur in the summer months.

EM Case of the Week is a weekly "pop quiz" for ED staff.

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

BROWARD HEALTH MEDICAL CENTER

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Warriors

The correct answer is A. Methods such as tourniquets, incision and oral suction, surgery, cryotherapy and electric shock therapy have been advocated in the past but are no longer recommended. Antivenom is the mainstay for treatment, along with fluid resuscitation.

PATHOPHYSIOLOGY

Pit viper snake venoms are hemotoxic and consist of proteins, polypeptides and enzymes that cause necrosis and hemolysis. Venoms are rapidly absorbed from the injection site and diffuse out of the vascular component, resulting in a very long half-life time elimination. Maximum serum concentration is reached after 3 hours.

Inflammatory process

- Phospholipase A2 hydrolyze membrane phospholipids, leading to release of prostaglandins and leukotrienes
- Activation of complement system
- Activation of mast cells, leading to release of histamine
- Proteinases directly activate the kinin system, inducing the release of bradykinin

Coagulation, fibrinolysis, hemorrhage

- Thrombin-like molecules induce fibrinopeptides A and B
- Hemorrhagins cause spontaneous systemic bleeding
- Disintegrins interfere with platelet aggregation by selectively binding to integrins, such as GPIIb/IIIa
- Metalloproteinases degrade platelet membrane glycoproteins and ligands, such as collagen and vWF

Myotoxicity/ Local tissue damage

- Myotoxins affect plasma membrane of muscle cells, causing *myonecrosis*

CLINICAL MANIFESTATIONS

Local tissue damage (ecchymosis, progressive tissue swelling, blistering), coagulopathy, rhabdomyolysis with nephrotoxicity, non-specific systemic effects (nausea, vomiting, diarrhea, diaphoresis, chills), abnormal vital signs (tachycardia, tachypnea, hypotension) and neurotoxicity (paresthesia, dizziness, seizures)

Water moccasin snake bite



Local edema and inflammation of the hand is obvious in this bite of a water moccasin (*Ancistrodon piscivorus*).

MANAGEMENT

Wounds should be properly cleaned and patients should receive tetanus prophylaxis, intravenous fluid, and antibiotics only for established infections or contaminated wounds (Augmentin, Unasyn).

Ancillary studies for coagulopathy and rhabdomyolysis should include a CBC, CMP, CK, PT/PTT, D-dimer, fibrinogen, UA, EKG.

Administration of antivenom is the mainstay treatment. Polyvalent equine F(ab')₂ antivenom (Anavip) is the most updated and approved antivenom product expected for use in 2018 (October?). It contains fragments of immunoglobulin G (IgG) that bind and neutralize venom toxins, facilitating redistribution away from target tissues and elimination from body.

Dosage and Administration

- IV use only
- Initial dose of Anavip is 10 vials (each box has 1 vial)
- Reconstitute contents with 10 mL normal saline, then further diluting to a total volume of 250 mL normal saline
- Infuse intravenously over 60 minutes
- For the first 10 minutes, infuse at a 25-50 mL/hour rate then increase to full 250 mL/hour rate until completion
- No known maximum dose

For a list of educational lectures, grand rounds, workshops, and didactics please visit BrowardER.com and **click** on the **"Conference"** link.

All are welcome to attend!



ABOUT THE AUTHOR

This month's case was written by Brittany Siegel. Brittany is a 4th year medical student from NSU-COM. She did her emergency medicine rotation at BHMC in April 2018. Brittany plans on pursuing a career in Pediatrics after graduation.

Clinical classification of United States Crotalinae* envenomation to guide FabAV administration

Category	Tissue effect	Systemic signs	Coagulopathy and bleeding
Minimal	Swelling, pain, and ecchymosis adjacent to the bite site	None	Normal coagulation parameters [¶] ; no bleeding
Moderate	Swelling, pain, and ecchymosis less than full extremity or less than 50 cm if bite on head, neck, or trunk	Present but not life-threatening (eg, nausea, vomiting, diarrhea, oral paresthesia, unusual tastes, tachycardia, tachypnea, mild hypotension [systolic BP >90 mmHg in an adult])	Abnormal coagulation parameters [¶] ; no bleeding or minor hematuria, gum bleeding, and/or epistaxis
Severe	Swelling, pain, ecchymosis involving more than the entire extremity; greater than 50 cm if bite on head, neck, or trunk; threatens the airway; OR signs of compartment syndrome	Present and life-threatening (eg, respiratory insufficiency, marked tachycardia for age with severe hypotension, obtundation, seizures)	Markedly abnormal coagulation parameters [¶] with serious bleeding

FabAV: polyvalent Crotalidae ovine immune Fab (Crofab, Protherics); BP: blood pressure.

* Includes bites by rattlesnakes, water moccasins (cottonmouths), and copperheads.

¶ Coagulation parameters include platelet count, prothrombin time (PT), partial thromboplastin time (PTT), fibrinogen, and fibrin degradation products (fibrin split products [FSP]).

OUTCOMES

Morbidity from venomous snake bites is low and associated with bites to the face or upper extremity. Loss of range of motion is the most common sequelae, while others include permanent weakness, pain, abnormal sensation, and skin discoloration. Mortality from Crotalinae snake bites is unusual (<1 percent of all bites) and is typically associated with proximal bites, no antivenom therapy or inadequate fluid resuscitation of shock.

Take Home Points

- Most common venomous snakes in Florida include the rattlesnake, water moccasins (cottonmouths) and copperheads.
- Clinical manifestations typically include local tissue damage, coagulopathy, rhabdomyolysis, increased vascular permeability and non-specific systemic effects
- Mainstay of treatment is antivenom (Anavip), the most updated product. Treatments to avoid in pit viper snake bites include: tourniquets, suctioning of wound, shock therapy, prophylactic fasciotomy, prophylactic antibiotics
- Morbidity is low and most victims fully recover after treatment
- Phone number for the National Poisons Information hotline, administered by the American Association of Poison Control Centers is 1-800-222-1222

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