Management of North American Pit Viper Envenomation
Includes rattlesnakes, copperheads, and cottonmouths (water moccasins)

Assess Patient
- Mark leading edge of swelling and tenderness every 15-30 minutes
- Immobilize and elevate extremity
- Tourniquets
- Puncture site, respiratory distress, hypotension, tachycardia, neuropraxia
- Contact poison control center (1-800-222-1222)

Check for Signs of Envenomation
- Swelling, tenderness, reddness, ecchymosis, or blebs at the bite site, or
- Elevated protome; decreased fibrinogen or platelets, or
- Systemic signs, such as hypotension, bleeding beyond the puncture site, or refractory vomiting, diarrhea, angioedema, neuropraxia

Check for Progression of Clinical Effects
- Swelling that is more than minimal and that is progressing, or
- Elevated protome; decreased fibrinogen or platelets, or
- Any systemic signs

Check for Initial Control of Envenomation Has Been Achieved
- Swelling and tenderness not progressing
- Protome, fibrinogen, and platelet levels normal or clearly improving
- Osteone (not hypotensive, etc)
- Neurotoxicity resolved or clearly improving

Monitor Patient
- Perform serial examinations
- Maintenance CroFab® therapy may be indicated
- Road Box 13 (Maintenance CroFab® Therapy
- Observe patient 18.24 hours after initial control for progression of any venom effect
- Follow-up labs 6-12 hours after initial control and prior to discharge
- If patient develops new or worsening signs of envenomation, administer additional doses of CroFab® per Box 4

Determine if Patient Meets Discharge Criteria
- No progression of any venom effect during the specified observation period
- No unfavorable laboratory trends in protome, fibrinogen, or platelets

See Post-Discharge Planning (Box 1.4)

Apparent Dry Bite/No Bite
- Do not administer CroFab®
- Observe patient 28 hours
- Repeat labs prior to discharge
- If patient develops signs of envenomation, return to Box 2

Apparent Minor Envenomation
- Do not administer CroFab®
- Observe patient 12-24 hours
- Repeat labs at 4-6 hours and prior to discharge
- If patient develops progression of any signs of envenomation, return to Box 3

Apparent Dry Bite/No Bite
- Do not administer CroFab®
- Observe patient 28 hours
- Repeat labs prior to discharge
- If patient develops signs of envenomation, return to Box 2

Signs of Envenomation
- Swelling, tenderness, reddness, ecchymosis, or blebs at the bite site, or
- Elevated protome; decreased fibrinogen or platelets, or
- Systemic signs, such as hypotension, bleeding beyond the puncture site, or refractory vomiting, diarrhea, angioedema, neuropraxia

1. Maintain envenomed patient in the ED or ICU
2. Perform initial diagnostic evaluation
3. Control of envenomation
4. Management of complications
5. Post-discharge planning

Primary Safety Information

CONTRAINDICATIONS
- Do not administer CroFab® to patients with a known history of hypersensitivity to any of its components, or to papaya or papaya unless the benefits outweigh the risks and appropriate management for anaphylactic reactions is readily available.

WARNINGS AND PRECAUTIONS
- Coagulopathy: In clinical settings, coagulopathy (the ratio of a coagulation abnormality after it has been successfully treated with antivenin), characterized by decreased fibrinogen, decreased platelets, and elevated prothrombin time, occurred in approximately half of the patients studied; one patient required hospitalization and additional antivenin administration. Recurrent coagulopathy may persist for 1 to 2 weeks or more. Patients who experience coagulopathy due to snakebite should be monitored for recurrent coagulopathy and be treated accordingly. Antivenin may also cause hypersensitivity reactions. Severe hypersensitivity reactions may occur with CroFab®. In case of scale hypersensitivity reactions, including anaphylaxis and anaphylactoid reactions, discontinuation of treatment is warranted. Patients allergic to papaya chymopapain, other papaya extracts, or any animal products may also have an allergic reaction to CroFab®. Follow-up all patients for signs and symptoms of delayed allergic reactions or serum sickness (e.g., rash, fever, myalgia, arthralgia).

ADVERSE REACTIONS
- The most common adverse reactions (incidence ≥ 5% of subjects) reported in the clinical studies were urticaria, rash, urticaria, and pruritus in 12 of the 42 patients. Two patients had a severe allergic reaction (severe hives and a severe rash and was following treatment and the patient was discharged/CroFab® due to an allergic reaction. Recurrent coagulopathy due to envenomation and requiring additional treatment may occur.

When to Call a Physician-Expert
- Direct consultation with a physician-expert is recommended in certain high-risk clinical situations:
- Life-threatening envenomation
- Shock
- Severe active bleeding
- Rhabdomyolysis
- Anaphylaxis

Maintenance CroFab® Therapy
- Maintenance therapy is additional CroFab® given after initial control to prevent recurrence of limb swelling
- Maintenance therapy is 2 vials of CroFab® QM 3 g q 6-12, 18 and 22 hours after initial control
- Maintenance therapy may not be indicated in certain situations, such as
- Minor envenomations
- Facilities where close observation by a physician-expert is available
- Follow local protocol or contact a regional poison center or physician-expert for advice

Post-Discharge Planning
- Instruct patient to return for:
- Worsening swelling that is not relieved by elevation
- Abnormal bleeding (gums, easy bruising, nosebleeds, etc)
- Instruct patient where to seek care if symptoms of serum sickness (fever, rash, muscle/joint pain) develop
- Bleeding precautions (no contact sports, elective surgery, or dental work, etc) for 2 weeks in patients with:
- Rattlesnake envenomation
- Abnormal protome, fibrinogen, or platelet count at any time
- Follow-up visits:
- CroFab® not given:
- Lab tests:
- Copperhead victims: PRN only
- Other snakes: follow up labs (protime, fibrinogen, platelets, hemoglobin) twice (2-3 days and 5-7 days), then PRN

Treatments Not Proven to Be Beneficial in the Management of Pit Viper Envenomation
- Cutting and/or suctioning of the wound
- Ice
- NSAIDs
- Prophylactic antibiotics
- Prophylactic fasciotomy
- Routine use of blood products
- Shock therapy
- Steroids (except for allergic phenomena)
- Tourniquets

Notes
- This worksheet is adapted from general advice from a panel of US snakebite experts convened in May 2010. No algorithm can mandate all clinical situations. Other valid approaches exist, and deviations from this worksheet based on individual patient needs, local resources, local treatment guidelines, and patient preferences are expected. This document is not intended to represent a standard of care. For more information, please see the full prescribing manuscript, available at www.biomedcentral.com.

The Snakebite911™ App provides access to useful information, from snake safety and basic first aid bite to how to manage and treatment in the ER.

Get the app:
Apple App Store
Google Play

In the case of poisoning, please call Poison Help at 1-800-222-1222 immediately, while the American Association of Poison Control Centers and its members do not endorse any antivenom product over any other, the nation’s poison experts stand ready to assist all in need of help.

24-Hour Medical Information:
- BTG Specialty Solutions Center™
  - Phone: 1-844-293-0007