Venomous Snakebites

Management of Venomous Snakebites

Five species of snakes are medically important in Missouri and Illinois. All are Crotaline pit vipers and include the following species: 1) the Copperhead is the most common perpetrator of venomous snakebites in Missouri, 2) Water Moccasin or Cottonmouth, 3) Timber Rattlesnake, 4) Pygmy Rattlesnake, and 5) Massasauga Rattlesnake. During the last 5 years, the Missouri Regional Poison Center has managed 643 venomous snakebites. In 2008 alone, the Poison Center received 155 calls concerning venomous snakebites; the breakdown of species involved is as follows: 96 Copperhead bites, 7 Rattlesnake bites, 5 Water Moccasin bites, and 47 snakebites where the species was unknown.

Copperhead

Approximately 20% of bites by venomous snakes are not accompanied by injection of venom and are considered “dry bites.” Most bites are subcutaneous, and are less severe than intramuscular envenomations.

Bites from Rattlesnakes are generally more serious bites, often causing both severe tissue injury and systemic coagulopathy; while Copperhead bites characteristically cause local tissue destruction manifested by progressive edema, pain and erythema, but rarely systemic coagulopathy.

What do you need to know to assess a venomous snakebite? What laboratory determinations are indicated?

It is of primary importance to differentiate between a venomous and a nonvenomous bite from the appearance of the bite site itself. Identification of the snake is secondary since it is often either not possible or inaccurate, and ultimately does not affect patient management.

The presence of 1 or more distinct fang marks indicate a venomous snakebite, while multiple teeth marks suggest that the bite is from a nonvenomous snake. It is important to remove jewelry, tight-fitting clothing, or footwear from the envenomated limb in anticipation of edema; and to immobilize the involved limb or body part at or slightly below heart level to slow the spread of venom in the prehospital setting. Mark and measure the bite site at the leading edge of any swelling, redness, or discoloration; measure the baseline circumference of the limb above the bite to monitor the progression of edema proximal to the fang puncture wounds. Repeat measurements and check vital signs frequently (i.e., every 15 minutes) to assess the severity and rapidity of progression.
Edema proximal to the bite site is a major indicator of severity of envenomation. Some degree of edema typically develops within 30 minutes and progresses over a period of 24 to 48 hours. The rate and degree of swelling depends on the amount and potency of venom. A patient with minimal or no edema within a few hours of a bite may still progress in severity over time since significant swelling may be delayed 8 to 12 hours. Infants, children, and the elderly, may not tolerate envenomation as well as a healthy adult. Children have less tissue mass in their extremities, so the same amount of venom may induce disproportionately severe local effect.

Changes in laboratory values, especially coagulation parameters, is another major indicator of severity of envenomation. Closely monitor CBC (hematocrit, hemoglobin, platelets), PT, PTT, INR, fibrinogen, D-dimer, urinalysis for hematuria and proteinuria, electrolytes, BUN, creatinine, CK, and pulse oximetry every 4 to 6 hours during treatment.

When is Crotalidae polyvalent immune Fab (CroFab®) indicated for a venomous snakebite? CroFab® is recommended for coagulopathies as indicated by abnormal laboratory values at any time in the clinical course. CroFab® is also recommended in cases where there is progressive local tissue injury as indicated by a rapid rate of swelling or a large degree of edema even in the absence of laboratory changes. Early use (i.e., within 6 hours) of CroFab® should be considered in any patient with evidence of mild envenomation or to prevent clinical deterioration and systemic coagulation abnormalities. Administration of CroFab® prior to the onset or worsening of toxic effects can prevent or reduce the extent of local tissue damage and potential loss of function.

Three aspects of crotaline snake envenomation can be beneficially affected by the administration of CroFab®: 1) Extension of local edema can be prevented, and pain may be alleviated, however existing edema and ecchymosis is not reversible, 2) Coagulopathy can be reversed, including abnormal PT or INR, thrombocytopenia, and hypofibrinogenemia, and 3) Systemic effects can be reversed, including nausea, vomiting, paresthesias, fasciculation, confusion, and hypotension.

What is the risk of compartment syndrome with snakebite envenomation?
Compartment syndrome is rare following pit viper bites since subfascial injection of venom is rare. The clinical condition after a venomous snakebite can mimic a compartment syndrome with features such as tense soft tissue swelling, muscle weakness, paresthesias, and pain on stretching of the muscles within the compartment. The edema is actually subcutaneous and external to the muscle compartments so arterial blood flow is maintained.

A true compartment syndrome cannot be reliably diagnosed clinically but requires direct measurement of compartment pressures. FALSELY elevated compartment pressures are common following venomous snakebites. Snakebite victims (especially children) are often anxious and may tense up muscles in the affected extremity during measurement, thereby falsely elevating compartment pressures.

Compartment pressure monitoring should be performed by a specialist while the patient is heavily sedated or, optimally, under general anesthesia to avoid falsely elevated readings. Fasciotomy is very rarely indicated. Published reports show that fasciotomy can often be avoided by adequate and early administration of CroFab® to prevent progression of edema and tissue injury. Since fasciotomy leads to increased morbidity and significant disfigurement; it should be performed only when specifically indicated in cases of deep muscle puncture by fangs accompanied by significant envenomation. A medical toxicologist should also be consulted in these cases.

Monitoring and administration of CroFab® is the mainstay of treatment for venomous snakebites. Health care personnel who are knowledgeable about snakebite care can facilitate an improved outcome in patients who sustain venomous snakebites.
PoisonSafe Practices

Many people dislike or misunderstand snakes. Irrational fears come from these misunderstandings and superstitions which have been handed down from one generation to the next. Although one should definitely respect poisonous snakes and approach with caution, remember that many snakes are harmless and beneficial because they eat insects, mice and other rodents. Many snakes will bite when threatened or surprised, but most will usually avoid an encounter if possible and only bite as a last resort. Snakes found in and near water are frequently mistaken as being poisonous. The majority of venomous snake bites can be prevented simply by not trying to capture or handle the snakes. Copperheads, by nature, are not aggressive. They do not go after people, do not search for people to bite and would rather stay motionless and undetected or try to avoid an intruder. Most snake bites will not be life threatening, but unless you are absolutely sure that you know the species, treat it seriously, and call the Poison Center at 1-800-222-1222.

SNAPK BITES

Most of the fifty species and subspecies of snakes found in Missouri are harmless, but there are five species which are poisonous. The Copperhead is the most common poisonous snake followed by the Water Moccasin or Cottonmouth, and three different rattlesnakes. All of these poisonous snakes are pit vipers, which means they have an opening on each side of the head called a sensory pit. Poisonous snakes have fangs; non-poisonous snakes have small rows of teeth. Poisonous snakes have a single row of scales on the underside of the tail; non-poisonous snakes have two rows of scales. The pit viper’s eyes have pupils which are elliptical in shape or the vertical shape like a cat’s eyes.

TIPS TO AVOID SNAKE BITES

• Stay away from areas where snakes likely live.
• Be cautious while hiking, especially around large rocks or logs. Wear protective shoes or boots. Consider using a walking stick when hiking.
• Do not place your hands under rocks or logs; tap the top of logs before stepping over them.
• Wear rubber boots when fishing in streams that may harbor the venomous Cottonmouth.
• Contact the Missouri Department of Conservation for more information and facts about Missouri snakes.

FIRST AID FOR POISONOUS SNAKE BITES

• Remain calm.
• Do not try to capture the snake.
• Note time of the bite, and remove all tight clothing or jewelry which may delay or hide swelling.
• Call the Poison Center immediately at 1-800-222-1222 for instructions on all snake bites.
• Immobilize the limb or body part at or slightly below heart level.
• Wash the bite area with soap and water.
• DO NOT use ice or a tourniquet.
• DO NOT cut over the fang marks and try to suck out the venom.
• Transport the patient to the closest hospital.
PoisonAlert

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