

## Chapter 36

# Bites and Stings

Arthropod, insect, and snake envenomation are sources of great concern and anxiety in transient populations, but in reality are not highly life threatening. Mortality rates in humans from most venom exposures are low. In animals, venom has three purposes: (1) defense, (2) prey immobilization, and (3) digestion.

There are specific problems with envenomation in children. Smaller children do worse with envenomation than adults because the snake or arthropod injects the same amount of venom into a much smaller host. Children are also poor historians, so a reliable story of the incident may be difficult to obtain. Unnecessary procedures, such as incision and suction over wounds and tourniquets, increase morbidity.

- History
  - Focus on the following when taking a history after envenomation:
    - ▶ Timing of the event
    - ▶ Location of the bite or sting
    - ▶ Nature of what happened
    - ▶ Whether or not spiders, snakes, or scorpions have been seen in the area or home
- Physical examination

When performing the physical examination, look at all areas of the body, paying special attention to the hands, feet, legs, buttocks, and genitalia. Look for tiny marks, erythema, and edema. Local tenderness is a sign of envenomation
- Specific sources of envenomation
  - Black widow spider
    - ▶ Found in every state except Alaska
    - ▶ Females are considerably larger than males and are responsible for all human envenomations because their teeth can penetrate human skin; they have a characteristic red hourglass on their abdomens and make irregular webs in fields

- ▶ There have been no deaths from black widow spiders in the United States in decades
- ▶ Signs and symptoms
  - ▷ The initial presentation can vary greatly; the bite can range from painless to excruciating. Pain, which will be worst in first 8–12 hours, may linger
  - ▷ Muscle fasciculations, weakness, and ptosis
  - ▷ Vomiting, salivation, hypertension, and priapism (rarely)
  - ▷ Fasciculations may be so severe that, when the abdominal muscles are involved, condition may mimic acute abdomen
- ▶ Treatment
  - ▷ Clean the bite area, ice the wound, and provide tetanus prophylaxis
  - ▷ Look for serious pain and neurological symptoms
  - ▷ Administer adjuncts for symptomatic treatment, such as the following:
    - Calcium gluconate (50–100 mg/kg for fasciculations; maximum dose of 2 g)
    - Muscle relaxants and benzodiazepines for severe muscle spasms
  - ▷ There is an antivenin available in the United States; however, it has been associated with serum sickness
- Brown recluse spider
  - ▶ From genus *Loxasceles*; body measures 1 cm, leg length is 2–3 cm
  - ▶ Brown with a dark violin shape on the anterior head and neck area (nicknamed “fiddle back”)
  - ▶ Hides in wood piles and closets and will bite when threatened (eg, when trapped in clothes or bed linens)
  - ▶ Signs and symptoms
    - ▷ Classic lesion has an area of central necrosis within an erythematous ring
    - ▷ Venom contains hemolysin and cytotoxin
    - ▷ Bite can result in dramatic hemolysis and renal injury; envenomation can lead to renal failure or herald coagulopathy
  - ▶ Treatment

- ▷ Check for hemoglobinuria and proteinuria in children
- ▷ Use blood urea nitrogen, creatinine, and liver function tests as well as urinary analysis and coagulation studies for seriously ill patients
- ▷ Provide supportive care
- Tarantula
  - ▶ Large, hairy, slow spiders
  - ▶ Will bite when threatened; depending on the size and strength of the spider, the bite can be painful, but most are only as painful as a bee sting
  - ▶ Far less dangerous than the black widow or the brown recluse
  - ▶ Some Latin American varieties have urticating hairs that they flick at prey by the thousands
  - ▶ Arabian Peninsula and Iran/ Afghanistan varieties
    - ▷ Common variety is called “Camel Spider,” but is actually the Near Eastern Solpugid, a nonspider arachnid
    - ▷ Maximum body size is 5 cm
    - ▷ They are nonvenomous
    - ▷ They are fast, moving at speeds up to 10 mph (if they run toward a person, they are likely trying to escape the hot sun)
    - ▷ Contrary to common belief, they do not eat the flesh of large animals
    - ▷ Bite may become secondarily infected
- Scorpion
  - ▶ Scorpions are common around the world; most bites are only as dangerous and painful as a bee sting
  - ▶ In the United States, only one indigenous scorpion, the bark scorpion (*Centruoides*), is life threatening
    - ▷ The bark scorpion is a nocturnal hunter
    - ▷ Found from southwest Texas to Arizona (there have not been any deaths related to bark scorpion stings in Arizona in over 30 y)
    - ▷ Venom contains at least five different neurotoxins
    - ▷ Signs and symptoms
      - The sting can affect the parasympathetic and sympathetic nervous systems and may also result in neuromotor effects

- Young children are more likely to have severe cardiorespiratory symptoms
- Up to 80% of children < 2 years old manifest with severe symptoms (as opposed to 5% of adults)
- ▷ Treatment
  - Because children can be poor historians, it may be helpful to use a diagnostic “tap test”; tapping over the inoculation site will elicit significant pain
  - Routine wound care includes cleaning the area and administering ice and acetaminophen (for pain) as needed; the inoculation site can be injected with 1% lidocaine
  - Treat any serious respiratory or neuromuscular symptoms with supportive measures
  - A sheep-derived antivenin is available through the University of Arizona
- ▶ In the Arabian Peninsula/Iraq, there are 14 indigenous scorpion species
  - ▷ *Androctonus crassicauda*: black or dark brown
  - ▷ *Leiurus quinquestriatus*: yellow; stings more people than *Androctonus*
  - ▷ *Hemiscorpius lepturus*: caused all winter stings in an Iranian study (10%–15% of all stings overall)
  - ▷ *Mesobuthus eupeus*: venom contains a neurotoxin; caused approximately 45% of stings in Iran
  - ▷ Up to 4% of all children hospitalized in Saudi Arabia from May through August have sustained scorpion stings
  - ▷ Most envenomations occur at night, mainly in bare-footed children or shepherds
  - ▷ Males are at least twice as likely as females to be stung
  - ▷ Mortality rate is 2%–5%
  - ▷ Signs and symptoms
    - Stings cause hypertension and central nervous system manifestations and are very painful
    - Generalized erythema occurs in 20%–25% of children under age 5 (unclear mechanism)
    - Cholinergic signs include exocrine gland hypersecretion, urinary frequency and incontinence, and

- ▀ increased gastrointestinal motility
  - Neurological symptoms include delirium, confusion, coma, restlessness, seizures, localized muscle spasm near sting site, opisthotonus, and paralysis
- ▷ Treatment
  - There is a polyvalent antivenin, but an Iranian case series failed to show effectiveness in humans
  - There is no antivenin available for cytotoxic venom
- Bees and wasps
  - ▶ Bees, wasps, and other stinging insects account for roughly one third of all envenomations
  - ▶ Bees are apids and sting defensively with a barbed stinger that stays in the victim; the bee dies after the sting
  - ▶ Wasps, hornets, and yellow jackets are vespids and have a smooth stinger used for hunting and protection; they can sting multiple times
  - ▶ Killer bees were imported to Brazil from Africa in 1956; they escaped captivity and have slowly been spreading north. They are aggressive and attack in swarms
  - ▶ Treatment
    - ▷ Most reactions are local and can be treated with acetaminophen and antihistamines
    - ▷ Consider steroid burst with antihistamine for large reactions
    - ▷ For anaphylaxis or anaphylactic reactions, treat with:
      - Epinephrine: 0.01 mg/kg of a 1:1,000 preparation, intramuscular; maximum pediatric dose is 0.3 mg
      - Steroids: 2 mg/kg intravenous (IV) methylprednisolone sodium succinate
- AND**
- Antihistamines: diphenhydramine 1 mg/kg IV
  - Observe for several hours for the late effects of anaphylaxis
- Fire ants
  - ▶ Venom is similar to that of bees and can be treated in much the same way
  - ▶ Found in southern United States to mid-Atlantic states

- Snakes
  - ▶ There are five families of poisonous snakes; only *Crotalidae* are common in North America (eg, rattlesnakes, water moccasins, copperheads)
  - ▶ There are 8,000 poisonous snake bites annually in the United States; only 10–15 are fatal
  - ▶ The higher venom-to-size ratio in young children means greater morbidity per bite
  - ▶ Young children tend to get bit on the lower extremities when they wander into a snake's area
  - ▶ Older children and teenagers tend to get bit on the upper extremities, presumably after trying to catch the snake
  - ▶ Treatment
    - ▷ Clean the wound
    - ▷ Remove all jewelry on affected limb
    - ▷ Treat pain, bleeding, and respiratory weakness
    - ▷ Apparent hypovolemia is due to distributive shock
    - ▷ Sheep-derived monoclonal antibody can also be used; it is associated with less serum sickness than horse-derived antibody
    - ▷ *Crotalidae* polyvalent immune fragment antigen binding (ovine), marketed as "CroFab" (Protherics, Inc, Nashville, Tenn), is currently the only licensed treatment for severe envenomations in the United States
      - To treat with CroFab, first mix 4–6 vials with 250 mL normal saline
      - Give 1 mL/min for the first 10 minutes
      - If the patient tolerates initial infusion, give the whole amount at 250 mL/h
      - Observe for 1 hour. If the patient's condition worsens, repeat the procedure; if not, give 2 vials IV every 6 hours for 18 hours
      - The dose does not vary based on the child's weight because the antibody is directed at the venom