Management of Common Bites and Stings

Nicholas E. Kman, MD
The Ohio State University Department of Emergency Medicine
Mary Jo Bowman, M.D.
Nationwide Children's Hospital
Columbus, Ohio

Case

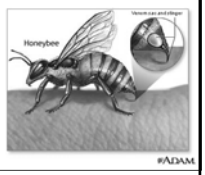
- 29 yo man was stung by a bee while working out in the yard. Now c/o skin itching, diffuse hives, swelling of arms and legs, tightness in throat, dizziness and difficulty talking.
- What do you do?

Objectives

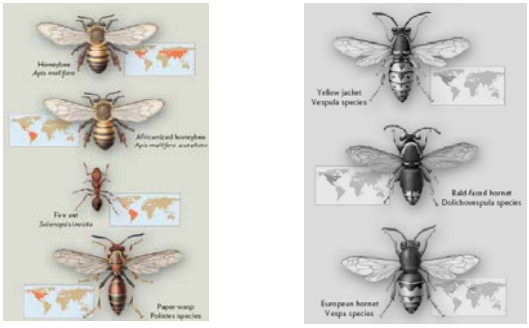
- Discuss common bites, stings and envenomations:
  - ✓ Bee stings
  - ✓ Spider bites
  - ✓ Snake envenomations
- Discuss management strategies for these bites

Hymenoptera Stings

- Stinging insects kill more people annually than do snakes
  - ✓ About 40-130 deaths per year
- Hymenoptera - honeybees, yellow jackets, wasps, hornets, bumble bees, and fire ants



Hymenoptera and Distribution



Freeman TM. Hypersensitivity to Hymenoptera Stings. N Engl J Med 2004;351:1978-84.

Local

- Majority of cases
- Local redness, pain, swelling
- May extend > 6 inches beyond sting
- May persist > 24 hours
- Remove stinger
- Ice, elevate
- Antihistamines, steroids, tetanus prophylaxis

Types of Reactions

- Local
- Mild generalized
- Severe generalized

Mild Generalized

- Symptoms away from site of sting – itching, hives, nausea, wheezing
- Antihistamines, steroids
- Inhaled beta-agonists for wheezing
- Consider epinephrine if wheezing
- Tetanus prophylaxis
- Local care
- Observation for 6-8 hrs

Severe Generalized

- Classically IgE-antibody mediated
- Anaphylaxis, laryngoedema, circulatory collapse, LOC
- Most deaths generally occur within 1st hour

Severe Generalized

- Admit all
- Home with Epi-Pen
- Refer for desensitization therapy

Severe Generalized

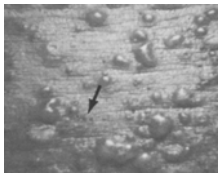
- ABCs – intubate early
- IVF – support blood pressure
- Epinephrine is drug of choice (0.1 mg/Kg of 1:1000 solution – initially given IM but may need IV drip
- Steroids
- Inhaled beta-agonists for bronchospasm
- H1/H2 blockers (Diphenhydramine and Cimetidine)

Ant Stings

- Ants sting 9.3 million people each year. Other Hymenoptera account for more than 1 million stings annually.
- Fire-ant venom is composed primarily of a transpiperidine alkaloid that causes tissue necrosis.

Ant Stings

- **Most fire-ant stings produce blister within 24 hours, which fills with necrotic material, giving appearance of pustule.**
- **Despite appearance, blisters are not infected and should be left intact.**



Case

- **41 yo male presents to ED after fishing all day at a local reservoir. Friends say he may have stuck himself with a fish hook b/c he complained of pain in hand when looking thru tackle box.**
- **Now with severe abdominal pain, cramping, N/V, and diaphoresis.**

Key Points: Bee Stings

- **ABC's**
- **Remove Stinger**
- **Epi for generalized reactions**
- **Steroids, Benadryl, Pepcid**
- **Admit all severe reactions, d/c with Epi Pen**

Ohio's Biting Spiders

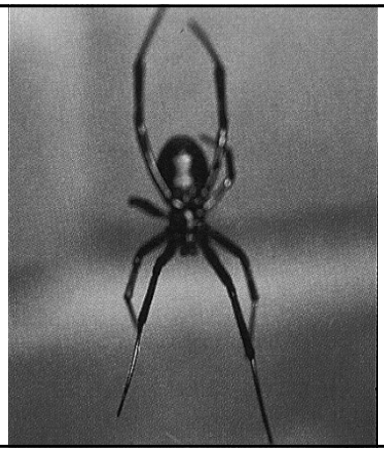
- **2 main groups of spiders; the recluse spiders and the widow spiders.**
- **The black widow, *Latrodectus mactans*, and the northern widow, *Latrodectus variolus*.**

Black Widow

- Latrodectus mactans
- Leading cause of death from spider bites in U.S.
- Shiny black with brilliant red hourglass marking on the abdomen
- Venom is complex protein that includes a neurotoxin

Black Widow

- >40,000 presumed bites reported to poison centers in last 20 years
- Warm, dark, dry places – woodpiles, outhouses outdoors; basements, garages indoors



Black Widow

Clinical Manifestations

- Few local symptoms associated with bite
- Generalized pain and rigidity of muscles 1-8 hrs after bite
- Pain felt in abdomen, thighs, flanks, chest
- Nausea, vomiting, urinary retention, chills
- 4-5% mortality rate, with death due to cardiovascular collapse

Black Widow

- No cytotoxic agents
- Neurotoxins – induce symptoms by stimulating the release of peripheral and central nervous system neurotransmitters

Black Widow

Management

- General supportive care-ABC's, local wound care, tetanus prophylaxis, loosely immobilize and elevate extremity
- Benzodiazepines and/or narcotics for pain and muscle spasm
- WATCH RESPIRATORY STATUS
- Calcium gluconate no longer recommended

Alpha-Latrotoxin

- Acts at pre-synaptic membrane of the neuromuscular junction, opening cation channels, and decreasing reuptake of acetylcholine which results in severe muscle cramping
- Can also trigger release of dopamine, norepinephrine, glutamate, GABA, and other neuropeptides

Black Widow

Management

- Latrodectus antivenom-use in respiratory arrest, seizures, uncontrolled hypertension, pregnancy
- Dose is 1-3 vials
- Admit – symptomatic children, pregnant women, pts. with history of hypertension

Key Points: Black Widow

- Black Widow (lactodectus)
  - ✓ Red hourglass on ventral aspect
  - ✓ Neurotoxic
    - Muscle cramps, pain, stiffness, rigid abdomen without tenderness to palpation
    - Can see systemic symptoms→ tachycardia, hypertension, sweating
    - Supportive care; May d/c in 4h if no systemic sx
    - Indications for antivenin (controversial):
      - Severe pain, severe htn, pregnant

The Brown Recluse

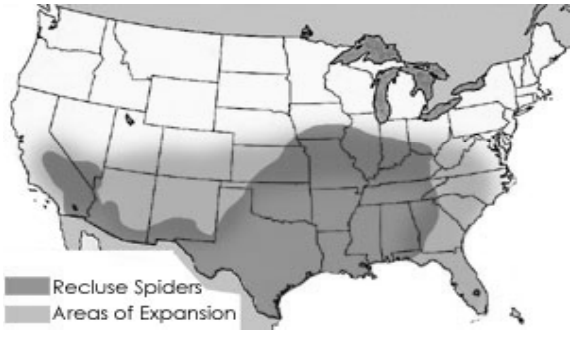
- Loxosceles reclusa has potential to inflict injury.
- Seen predominantly in South Central United States.
- Adult spiders are soft-bodied and yellowish-tan to dark brown.
- 1/4 to 1/2 inch long, and leg span is size of half dollar.

Brown Recluse Spider Bite Manifestations and Management: Slideshow, MedScape from WebMD Emergency Medicine.

Case

- 2 yo girl presents to your emergency department. The child was in her car seat when she immediately started crying. Dad noticed a welt that "must be one a them spider bites".
- You roll your eyes as you walk in the room to I&D another abscess.

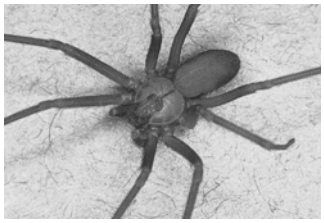
Brown Recluse Territory



www.brownreclusespider.com/faq.htm

Brown Recluse Bites

- **Distinguishing characteristic is the violin-shaped marking on the dorsal cephalothorax.**



Brown Recluse Bites

- **Bites are rare even in houses that are heavily infested with spiders.**
- **For this reason, a diagnosis of a recluse bite is unlikely in areas that lack significant populations of Loxosceles spiders.**

Brown Recluse Bites

- **Incidents usually occur in summer months.**
- **The spider prefers dark, dry, and undisturbed locations, such as woodpiles, the underside of rocks, and storage areas in garages, attics, basements, and linen closets.**

Brown Recluse Bites

- **In 2005, 2236 exposures called into poison centers**
- **464 victims less than 19 years of age**
- **Dark environments in house – attics, basements, boxes, closets**

Anderson RJ, Campoli J, Johar SK, Schumacher KA, Allison EJ. Suspected Brown Recluse Envenomation: A Case Report and Review of Different Treatment Modalities. J Emerg Med 2010.

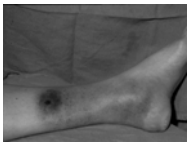
Brown Recluse Bite Progression

Clinical Manifestations

- **Bite is usually innocuous**
- **Spectrum is from minor local reaction to severe necrotic arachnidism**
- **Mild to moderate pain 6 hrs after bite; erythema develops with central blister or pustule; subcutaneous discoloration spreading over 3-4 days; ulceration**

Brown Recluse Venom

- **Cytotoxic enyzmes cause destruction of local cell membranes:**
  - ✓ **Alkaline phosphatase**
  - ✓ **5-ribonucleotide phosphohydrolase**
  - ✓ **Esterase**
  - ✓ **Hyaluronidase**
  - ✓ **SPHINGOMYELINASE D**



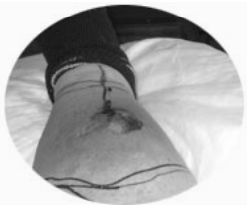
Brown Recluse Bites

- **< 10% of envenomations result in severe skin necrosis.**
- **Wounds destined for necrosis usually show signs such as bullae formation, cyanosis, and hyperesthesia, within 6-12 hours.**

Anderson RJ, Campoli J, Johar SK, Schumacher KA, Allison EJ. Suspected Brown Recluse Envenomation: A Case Report and Review of Different Treatment Modalities. J Emerg Med 2010.

"The Old Red, White and Blue"

- **Central blistering surrounded by a ring of blanched skin that is surrounded by large area of asymmetric erythema leads to typical "red, white, and blue" sign of a recluse bite.**
- **Usually by 48-72hrs.**



Brown Recluse Bites

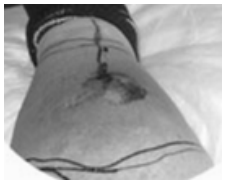
- In this patient, the bite area turned blue and dark red by the evening of the first day.

Systemic Reaction or Loxoscelism

- Fever, chills
- Arthralgias/myalgias
- Malaise, weakness
- Nausea, vomiting
- Morbilliform eruption with petechiae
- Intravascular hemolysis, hematuria, renal failure

Brown Recluse Bites

- Cutaneous necrosis: bulla develops at center of affected area and becomes necrotic.
- Areas with increased adipose tissue are more prone to severe necrosis than bites occurring at other sites.



Brown Recluse Bite Diagnosis

- No specific serologic, biochemical or histologic test
- PCR
- Vigorous supportive care
- Labs – cbc, platelets, UA, BUN, creatinine
- Once large areas have demarcated – surgical excision and skin grafting

Brown Recluse Bite Treatment

- First Line:
  - ✓RICE
  - ✓Aspirin and Antihistamines
  - ✓Tetanus Update
  - ✓Antibiotics if tissue breakdown

Bite Management Summary

- RICE: Rest, Ice, Compression and Elevation of extremity, loose immobilization
- Tetanus status
- If necrosis – debridement, grafting (typically 6-8 weeks after bite).
- Admit – if systemic symptoms, evidence of coagulopathy, hemolysis, hemoglobinuria

Brown Recluse Bite Treatment

- Steroids (efficacy is up for debate)
- Colchicine
- Hyperbaric oxygen therapy (conflicting results)
- Electric shock therapy
- Dapsone (moderate to severe or rapid disease, never in children)

Brown Recluse Bite Outcomes

- Prognosis for recluse bites is good, and most patients show excellent outcome.
- In most, pain subsides within 1 week, and reduction in size of the necrosis is evident.
- Healing may be slow, but all recluse wounds heal, usually with a minimum of scar tissue.

Key Points: Brown Recluse

- Brown Recluse (loxosceles)
  - ✓ Violin on dorsum
  - ✓ Tissue toxicity
  - ✓ Dapsone helps counteract the effects of the venom?? (controversial)
    - Contraindicated in G6PD deficiency
  - ✓ Observe for 6h for systemic symptoms

Case

- 18 month male transferred from Kentucky
- Bit on hand by baby copperhead snake
- Hospitalized locally
- Transferred due to progressive swelling and ecchymosis and concern about compartment syndrome

Snake Bites

Families in the U.S.

- **Viperidae**
- **Crotalinae (pit vipers)**
- **Elapidae (coral snakes)**

Snake Bites

Crotalinae Genera

- **Crotalus (rattlesnakes) – 15 species**
- **Agkistrodon – includes cottonmouth and copperhead**
- **Sistrurus – includes pygmy rattlesnake and massasauga**

Ohio Poisonous Snakes

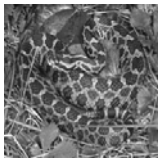
- **Northern Copperheads**
  - ✓ **Widely scattered throughout most of unglaciated Ohio.**
  - ✓ **Prefer rocky, wooded hillsides of southeastern Ohio.**
  - ✓ **Stay away from well settled areas.**

Ohio Poisonous Snakes

- **Timber Rattlesnake**
  - ✓ **Timber rattlers are one of the most dangerous snakes in northeastern America.**
  - ✓ **May be in excess of 6 ft, but average 3-4 ft.**
  - ✓ **Timber rattlers most numerous in more remote areas of Zaleski, Pike, Shawnee, and Tar Hollow state forests.**

Ohio Poisonous Snakes

- **Eastern Massasauga**
  - ✓ **"Swamp rattler" and "black snapper" are other names given to small rattlesnake.**
  - ✓ **Massasauga swamp rattlers are widely scattered.**
  - ✓ **Colonies still persist in bogs, swamps, and wet prairies within glaciated Ohio.**



Snake Bites

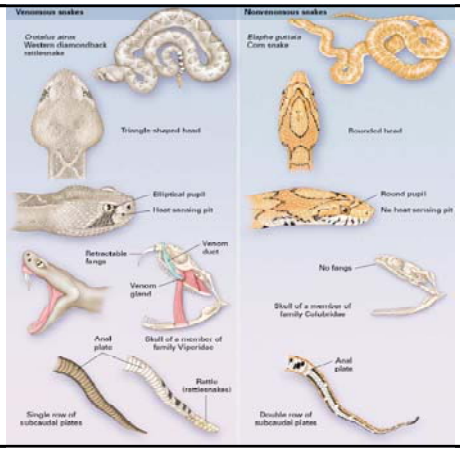
Statistics

- **Crotalinae – 99% of venomous snakebites in U.S.**
- **65% - rattlesnakes**
- **25% - copperheads**
- **10% - cottonmouths**

Snake Bites

Statistics

- **2005 – 2900+ bites reported to poison centers (8000/yr is average)**
- **116 < 6 years of age**
- **542 6-10 years of age**
- **6 deaths**
- **171 – life-threatening**



Snake Bites

Epidemiology

- **Incidence – 3.74 bites/100,000 population**
- **90% of envenomations occur between April and October**
- **50% of bites occur from 2-9 PM**
- **Male:Female ratio 9:1**
- **At least 40% of bites occur when a snake is purposely handled**

Snake Bites

Children have more clinical severity:

- **Smaller limbs**
- **Less subcutaneous tissue**
- **Smaller body mass**
- **Receive more venom per kg body wt**

Crotaline Venom

- Components cause direct tissue injury, capillary leakage, coagulopathy, and neurotoxicity
- Tissue damage at the site of the bite – the most common complication following envenomation
- Local reactions – increased blood vessel permeability and direct tissue necrosis

Snake Bites

Thrombocytopenia

- Platelet destruction may be mediated by action of phospholipases which damage platelet membranes
- Platelets may also be sequestered in local microvasculature and released after antivenin treatment

Snake Bites

Hematologic Abnormalities

- Coagulopathies in over 60%
- Hypofibrinogenemia in 49%
- Thrombocytopenia in 33%

Acad Emerg Med Feb 2001

Snake Bites

Crotalocytin

- Found in Timber Rattlesnake venom
- Causes platelet aggregation
- At least partially responsible for thrombocytopenia – common and often severe

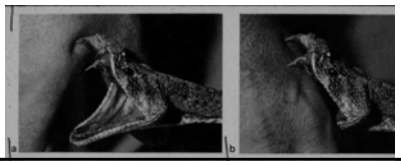
Ann Emerg Med Jul 1997

Snake Bites

- Venom of cottonmouth produces less severe local and systemic pathology
- Copperhead envenomations cause significant soft tissue edema but usually not significant coagulopathy, systemic symptoms, or extensive tissue destruction

Signs and Symptoms

- 1 or more fang marks, pain, edema, erythema, or ecchymosis. Bullae may appear.
- Systemic effects: AMS, tachycardia, tachypnea, resp distress, hypotension, coagulopathy, renal failure, hemolysis.

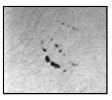


Signs and Symptoms

- Common reaction is impending doom. Fear may cause N/V/D, fainting, tachycardia, and cold clammy skin.
- Local findings in 30-60 minutes. May see edema w/in 10 min. Pain usually evident within 5 minutes.

Snake Bite

Grades of Envenomation



- ✓ Grade 0
  - Fang marks
  - No envenomation – 25%
- ✓ Grade I
  - "Mild" envenomation
  - Fang marks
  - Pain and edema at site
  - Local ecchymosis
  - Blistering
  - Necrosis
  - Minimal to no spread of edema proximal to site

Moderate

- 56% of bites
- Severe pain
- Spreading edema beyond site of bite
- Systemic signs – nausea, vomiting, paresthesias, muscle fasciculations, mild hypotension

Snake Bites

Management

- Maintain vital signs (ABC's)
- Reduce venom effects
- Prevent complicated sequelae
- Minimize tissue damage

Severe

- Marked swelling of extremity that occurs rapidly
- Subcutaneous ecchymosis
- Systemic symptoms – coagulopathy, hypotension, altered mental status

Snake Bites

Immediate First Aid

- Get away from the snake
- Stay calm
- Immobilize the bitten extremity at a position of heart level or just below
- Apply a constricting band, not tourniquet
- May apply suction device
- TRANSPORT TO MEDICAL FACILITY

Snake Bites

Don’ts

- Do not incise the bite
- Do not ice the bite
- Do not remove constricting band

Snake Bites

Baseline Labs

- CBC with diff, plts
- Electrolytes, BUN, creatinine
- CPK
- Coagulation studies
- Type and cross
- Urinalysis

Snake Bites

ED Management

- Notify Regional Poison Center
- ABC’s
- At least 1 IV line, draw labs while starting
- If no signs of envenomation, may observe for further progression
- Measure circumference of limb
- If signs of envenomation, antivenin admin.

Snake Bites

Antivenin

- Polyvalent Crotalinae antivenin
- Available in U.S. since 1947
- Mainstay of medical management
- Horse serum derived
- Dosing varies according to severity
- Production discontinued in 2002

Snake Bites

Ovine Fab Antivenin (CroFab)

- 4-6 vials
- Additional 4-6 vials until control achieved
- Scheduled 2-vial doses at 6, 12, and 18 hr
- Initial dose given slowly for first 10 min
- Rest of dose over 1 hr
- Dosages appear safe in pediatric population

Pediatrics Nov 2002

Compartment Syndrome

- Pain out of proportion to injury
- Hypesthesia
- Pain on passive stretch of muscles
- Tenseness of compartment on palpation
- Weakness of muscles in the compartment
- All are toxic effects of venom
- Need to measure compartment pressures

Snake Bites

Other Management

- Cleanse wound thoroughly
- Tetanus prophylaxis
- General supportive care
- Antibiotic prophylaxis is controversial
- ANALGESICS - opioids

Compartment Syndrome

At Risk Patients

- Patients treated with cryotherapy
- Patients with delayed or inadequate administration of antivenin
- True intramuscular injection of venom

Compartment Syndrome

Protocol

- **Elevate limb**
- **Mannitol 1-2 gm/kg IV**
- **CroFab 4-6 vials**
- **Remeasure pressures**
- **Fasciotomy if pressure still elevated**

Snake Bites

Complications

- **Some patients premedicate with alcohol, marijuana or other drugs – respond more intensely to envenomation and may need larger doses of antivenin**

Snake Bites

Complications

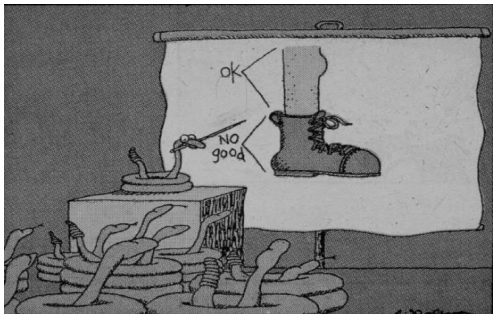
- **Serum sickness (type III hypersensitivity) – can occur up to 3 weeks after antivenin**
- **Fever, chills, arthralgias, diffuse rash**
- **Rx – steroids, antihistamines**

Ann Emerg Med Jun 2002

Key Points: Snake Bites

- **Snakes**
  - ✓ **Crotalinae**
    - **Grade the bite according to presence of systemic toxicity**
      - **Mod/severe bites have systemic toxicity or are rapidly progressive**
    - **Use antivenin for mod/severe bites**
    - **Observe dry bites for 8-12h; admit all others**

Questions



Thanks

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