Bites, Stings and.... Other Emergency Things

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Continuing Medical Education
Disclosure Statement

Dr. Dachs has nothing to disclose.

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Learning Objectives

1. Appropriately manage a variety of animal bites.
2. Appropriately manage tick-borne illness
3. Recognize and manage acute allergic reactions.
4. Recognize and determine which toxicology emergencies require specific antidotes.
5. Review current ACLS guidelines.
Animal Bites

1. Which of the following bites has the highest risk of infection?

A. Cat bite to the hand
B. Human bite to the face
C. Dog bite to the thigh
D. Spider bite to the arm
Animal Bites

1. Which of the following bites has the highest risk of infection?

A. Cat bite to the hand
B. Human bite to the face
C. Dog bite to the thigh
D. Spider bite to the arm

**62%**  ✔ A. Cat bite to the hand
**35%**  B. Human bite to the face
**2%**  C. Dog bite to the thigh
**2%**  D. Spider bite to the arm
A. Cat Bite

- 5 to 18% of all reported bites
- Puncture wounds
- 80% of bites become infected
  - 53-80% with *Pasteurella multocida*
  - Watch for bone and joint infection

*RX: Amoxicillin-clavulanate*
B. Human Bite

- Watch for *closed fist* injury
- High rate of infection, 26-83% polymicrobial

<table>
<thead>
<tr>
<th>Bacteroides species, 82%</th>
<th>Peptostreptococcus, 26%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viridans Streptococci, 100%</td>
<td>S. aureus, 29%</td>
</tr>
<tr>
<td>S. epidermidis, 53%</td>
<td>Eikenella species, 15%</td>
</tr>
<tr>
<td>Corynebacterium species, 41%</td>
<td></td>
</tr>
</tbody>
</table>

- Copious irrigation, avoid closure
- **RX:** Amoxicillin-clavulanate x 5 days
C. Dog Bite

- 80 to 90% of all reported bites (#1)
- Most common on extremities
- Only 5% of bites develop infection
  - Higher rate in hands, deep puncture, older pts.

<table>
<thead>
<tr>
<th>Pasteurella multocida</th>
<th>S. aureus, 29%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteroides species -</td>
<td>Fusobacterium</td>
</tr>
<tr>
<td>Fusobacterium species</td>
<td></td>
</tr>
<tr>
<td>EF-4 bacteria</td>
<td>Eikenella species, 15%</td>
</tr>
<tr>
<td>DF-2 bacteria</td>
<td>(Capnocytophaga sp)</td>
</tr>
</tbody>
</table>

- Primary closure - OK
- +/- Amoxicillin-clavulanate
Bites and Stings

2. A 40-year-old male presents with right axillary swelling over the past 3 weeks. Large, multiple lymph nodes are present, but no fever or chills. He has a cat, dog, and parrot in his home.

The most likely diagnosis is:

A. Cat scratch disease
B. Sporotrichosis
C. Brucellosis
D. Psittacosis
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The most likely diagnosis is:

A. Cat scratch disease [88%]
B. Sporotrichosis [3%]
C. Brucellosis [3%]
D. Psittacosis [6%]
Cat Scratch Disease

- 22,000 cases/year, 2000 hospitalizations/year
- Regional lymphadenopathy, 10% suppurative
  - Axillary/epitrochlear nodes 46%
  - Cervical 26%, inguinal 17%
- *Bartonella (Rochalimaea) henselae* - small Gr (-) rod
- Diagnosis: Cat scratch and serologic testing (IFA)

- Rx: Only 1 prospective blinded study-
  More rapid resolution of LN size with azithromycin

- Self-limiting disease, 1 to 2 months
  *Do NOT I & D!!!*
## Sporotrichosis

- "Rose gardener's disease" - fungus *Sporothrix schenckii*
- Painless nodular lesions (at the point of entry) also along lymphatic channels.

## Psittacosis

- Atypical pneumonia
- Contracted from parrots (and many other species of bird)
- *Chlamydia psittaci*

## Brucellosis

- Febrile illness, myalgias,
- Due to ingestion of unsterilized milk or meat
- *Brucella* - small, Gram Neg(-) coccobacilli
3. A 24-year-old male presents with a 3-day history of a rash that is increasing in size.
- It is not (-) painful or tender.
- It is flat, oval, 14 cm x 7 cm in size, has central clearing and has no fluctuance.
- No associated fever/chills or systemic symptoms.
- No new medications. No recall of any insect bite.
- He recently vacationed on Martha’s Vineyard, MA.
3. A 24-year-old male presents with a 3-day history of a rash that is continuing to increase in size. The rash is not painful or tender. It is flat, oval, 14 cm x 7 cm in size, has central clearing and has no fluctuance. No associated fever/chills or systemic symptoms. No new medications. No recall of any insect bite. He recently vacationed on Martha’s Vineyard, MA.

A. Prescribe azithromycin 500mg qd x 5 days
B. Prescribe doxycycline 100mg BID x 14 days
C. Obtain a Lyme titer, if positive treat with ceftriaxone.
D. Obtain a Lyme titer, if positive, confirm with a Western blot study and if positive treat with ceftriaxone.
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Lyme Disease

• Due to spirochete: *Borrelia burgdorferi*
• Transmitted by: Deer tick
  – *Ixodes scapularis* and *Ixodes pacificus*

From left to right, an *Ixodes scapularis* larva, nymph, adult male tick, and adult female tick.
Lyme Disease

• Due to spirochete: *Borrelia burgdorferi*

• Transmitted by: Deer tick
  – *Ixodes scapularis* and *Ixodes pacificus*

• Stages: Early, Late, Post-Lyme
  – I. Early Lyme Disease: **Erythema migrans**
    • Develops 7-14 days after bite (range 3-30 days)
    • “Clinical findings are sufficient for the diagnosis of erythema migrans”
    • “Serologic testing is too insensitive in the acute phase (the first 2 weeks) to be helpful diagnostically”

_IDSA guideline, 2006_
Illustrative Examples of Culture-Confirmed *Erythema Migrans*.

![Image 1](Courtesy of Wikipedia)

![Image 2](Courtesy of the CDC/James Gathany)
Lyme Disease

• Early Lyme Disease
  – *Erythema migrans*: present 50-70% of cases
  Treatment options:
  • Doxycycline 100 mg BID, 10-21 days
  • Amoxicillin 500 mg TID, 10-21 days
  • Cefuroxime axetil 500mg BID, 10-21 days
  – Neurologic disease:
  • Cranial neuropathy (7th nerve), radiculopathy, lymphocytic meningitis
  – Cardiac disease: think A-V block

*IDSA guideline, 2006*
Lyme Disease

• Late Lyme disease
  – Lyme arthritis:
    • Large joints, typically knees
  – Neurologic disease:
    • Encephalopathy
    • Peripheral neuropathy

• Post-Lyme disease syndromes
  – “…unexplained chronic subjective symptoms following treatment…”

Do not confuse with “Jarisch-Herxheimer reaction”
Lyme Disease Treatment

• Watch for Jarisch-Herxheimer reaction
  – Fever, chills, myalgias, headache
  
  **Remember syphilis…**

  – Treat symptomatically, do not d/c or switch antibiotic
Other Deer Tick-Borne Illnesses

- **HGA**: Human granulocytic *anaplasmosis*
  - Previously known as “*ehrlichiosis*”
  - Due to *Anaplasma phagocytophilum*
  - Within 3 weeks of tick bite…
    - Fever, chills, and headache, with
    - Thrombocytopenia, leukopenia, elevated LFT’s

- **Babesiosis**
  - Malaria-like illness with intracellular protazoa
  - Hemolytic anemia, thrombocytopenia, elevated LFT’s

All 3 associated with deer tick
Other Tick-Borne Illnesses

- Rocky Mountain Spotted Fever
  - Organism: *Rickettsia rickettsii*, transmitted by
    - The American dog tick and
    - The Rocky Mountain wood tick.
  - 90% of cases are April - September.
  - > 50% of cases involve children < 15 years old
  - Symptoms: 5-10 days after tick bite:
    - Flu-like illness
    - Rash
    - Later…multisystem involvement

*Photo courtesy of CDC*
Other Tick-Borne Illnesses

- Tularemia
- Bartonella
- Q fever
- Relapsing fever
- STARI-Masters’ disease
- Colorado tick fever
- Tick paralysis
4. A 64-year-old male presents to the ED with diffuse pruritus and erythema along with facial and oral swelling. This occurred 15 minutes after eating peanuts. His blood pressure is 65/35 mm Hg, pulse is 120 bpm.
Allergic Reactions

4. A 64-year-old male presents to the ED with diffuse pruritus and erythema along with facial and oral swelling. This occurred 15 minutes after eating peanuts. His blood pressure is 65/35 mm Hg, pulse is 120 bpm. This patient is experiencing:

A. Urticaria
B. Angioedema
C. Anaphylaxis
D. Anaphylactoid reaction
4. A 64-year-old male presents to the ED with diffuse pruritus and erythema along with facial and oral swelling. This occurred 15 minutes after eating peanuts. His blood pressure is 65/35 mm Hg, pulse is 120 bpm. This patient is experiencing:

A. Urticaria
B. Angioedema
C. Anaphylaxis
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The correct answer is C. Anaphylaxis.
Allergy: Reactions

- **Urticaria** (hives) - IgE mediated
- **Angioedema** - may be
  1. IgE-mediated or
  2. Idiopathic (ACE-induced), not true allergy
  
  *Result: Swelling of face, neck, and tongue*

- **Anaphylaxis** - may occur within seconds to 1 hour
  - Skin rash, respiratory symptoms, hypotension, GI distress

- **Anaphylactoid reactions**: Non-immunologic (not IgE)-mediated release of granules from cells not true allergy (eg, radiopaque contrast)
Etiologic Agents

Anaphylactic: *IgE*-dependent
- Food
- Medication
- Insect venom
- Latex
- Exercise

Anaphylactoid: Non-IgE/nonimmunologic
- Opioids
- ASA and NSAIDs
- Radiocontrast media
5. The 64-year-old patient with anaphylaxis in the previous case should receive which of the following medications:

A. Epinephrine
B. Epinephrine plus diphenhydramine
C. Epinephrine plus diphenhydramine plus methylprednisolone
D. Epinephrine plus diphenhydramine plus methylprednisolone plus ranitidine
5. The 64-year-old patient with anaphylaxis in the previous case should receive which of the following medications:

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66%
Allergic Reaction: Treatment

• **Vasoconstrictors:** Epinephrine
  *Mild-moderate: 0.3-0.5 cc 1:1000 solution, SQ or IM
  **Severe: 1-5 cc of 1:10,000 solution, IV
  ***If pt. On B-Blocker - Give glucagon 1-5 mg IV
Children 0.01 mg/kg

0.2 - 0.5 ml SQ/IM (1:1000)
(1 mg/mL)

1ug/min (1:10,000)
1 mg in 1L NS at 1 cc/min
Allergic Reaction: Treatment

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  If Epi-Pen is used, refer to ED for follow up
  Reason: chance of biphasic reaction
  The “second wave”
Allergic Reactions: Treatment

- **Vasoconstrictors:** Epinephrine
  *Mild-moderate: 0.3-0.5 cc 1:1000 solution, SQ or IM
  **Severe: 1-5 cc of 1:10,000 solution, IV
  ***If pt. on B-Blocker, give glucagon 1-5 mg IV

- **H1 antagonist:** diphenhydramine

- **H2 antagonist:** yes, H2-blocker du jour

- **Steroids:**
  - Do nothing for acute episode
  - May prevent recurrence
# Antihistamines: Don’t forget the H2 blocker

## Allergic Reactions: Treatment

### Methods:
91 ED pts. with acute allergic symptoms, randomized to:

<table>
<thead>
<tr>
<th>Results</th>
<th>Diphenhydramine 50 mg IV + ranitidine 50 mg IV</th>
<th>Diphenhydramine 50 mg IV + placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urticaria at 2 hrs</td>
<td>8%</td>
<td>26%</td>
</tr>
<tr>
<td>Need for additional antihistamines</td>
<td>4%</td>
<td>23%</td>
</tr>
</tbody>
</table>

Another Case...

6. 57 y/o female presents to ED/office noting that upon awakening her tongue was very swollen. Denies trauma. No fever/chills.

PMHx: HTN, NIDDM. Meds: lisinopril, metformin

VS: BP = 160/80, P = 90, RR = 24, T = 98.

Exam: Massively enlarged tongue (see photo).
6. 57 y/o female presents to ED/office noting that upon awakening her tongue was very swollen. Denies trauma. No fever/chills. PMHx: HTN, NIDDM. Meds: lisinopril, metformin VS: BP = 160/80, P = 90, RR = 24, T = 98. Exam: Massively enlarged tongue (see photo).

The most likely diagnosis is:

A. ACE-induced angioedema
B. Type I hypersensitivity reaction
C. Bee sting to the tongue
D. Scombroid poisoning
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The most likely diagnosis is:

- A. ACE-induced angioedema 97%
- B. Type I hypersensitivity reaction 1%
- C. Bee sting to the tongue 1%
- D. Scombroid poisoning 2%
ACE-Induced Angioedema

- **NOT** an allergic reaction
- Due to accumulation of bradykinin (?)
- Can occur months to years after ACE use
- Treatment: supportive
Can You Give an ARB to a Patient with ACE-Induced Angioedema?

• In theory….YES

Data: Very limited… (on pts. switched to ARB)
1. 3/39 pts. (7.7%) developed AE (CHARM trial)¹
2. 2/26 pts. (8%) developed AE²

¹ Lancet 2003 ² Arch Intern Med 2004
Bites, Stings, and Other Things:

Bee Stings

- **Complex venom**
  - Enzymes
  - Proteins
  - Serotonin
  - Acetylcholine
  - Histamine

- **2 groups:**
  - **Vespids**
    - Yellow jackets
    - Wasps
    - Hornets
  - **Apids**
    - Honey bees
    - Bumble bees

- Pain
- Erythema
- STS
- Tingling

**Normal response**
Bee Stings: 4 Potential Reactions

- **Local reaction:** common
- **Toxic reactions:** often > 10 stings at once
  ==> N/V/D, lightheaded, syncope, headache
- **Delayed reaction:** 10-14 days later, serum-sickness-like ==> malaise, headache, polyarthralgias
- **Anaphylaxis:** IgE-mediated
Allergic Reactions:

**Back to Medical School**

- **Type I (immediate hypersensitivity):** antigen attaches to IgE and IgG4 on mast cells and basophils ==> degranulation release mediators (increased vascular permeability, smooth muscle constriction, etc…)

- **Type II:** IgG and IgM Ab’s react to Ag on cell surfaces eg, blood transfusion rxn, ITP, hemolytic anemias

- **Type III - (immune complex):** Ag-Ab complex triggers complement system ==> eg, post-strep GN, serum sickness

- **Type IV (delayed hypersensitivity):** T cell-mediated eg, PPD, poison ivy
Scombroid Poisoning: “Pseudo” Fish Allergy

- Mimics allergic reaction - facial flushing, diaphoresis, hives, edema, diarrhea, peppery taste
- Occurs minutes to 1-2 hours after eating contaminated fish
- Classically tuna and mackerel (Scombroidae family), can occur in others
- Histidine in muscle converted by bacteria to histamine.
- Rx: H1 and H2 blockers
- Self-limiting: 4-6 hours
Ciguatera Poisoning

• Ingestion of reef fish that have accumulated sufficient amounts of the dinoflagellate
  – Most common: barracuda, amberjack, grouper, snapper, sturgeon, king mackerel

• GI or neurologic symptoms (or a mixed)
  – Onset 1-6 hrs after eating, lasts weeks-months
  – *Cold sensation reversal*: perceives cold temperatures as hot sensations (and vice versa)
  – Occurs in 80% of patients and *pathognomonic*
Environmental Injuries: 
A. Cold-Related Injuries

- **Chilblains (or pernio):** is an abnormal vascular response to cold resulting in inflammatory skin condition with pruritus and/or painful erythematous to violaceous acral lesions

- **Frostenp:** superficial freeze injury characterized by lack of extracellular ice crystal formation => pale, painful tissue
  
  Resolves with rewarming; *no tissue loss*

- **Frostbite:** ice crystal formation, *(+) tissue loss*

---

*Rapid rewarming in circulating water, 104-108F (40-42C)*
Environmental Injuries:
B. Heat-Related Illness

- **Heat exhaustion**: nonspecific symptoms
  - Dizziness, weakness, malaise, N/V, HA, *diaphoresis*
  - Temp: normal - 104F (40C), *normal neuro exam*

- **Heat stroke**: 2 versions:
  - Classic
  - Exertional

*Both (+) CNS dysfunction*

**Risk factors:**
1) Exogenous heat gain
2) Increased heat production
3) Decreased heat dispersion
   a. Dehydration
   b. CV disease
   c. Extreme of age
   d. Obesity
   e. Improper clothing
   f. Skin disease
   g. Drugs
Environmental Injuries: Heat-Related Illness

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  – Classic: elderly, develops more gradually
    ➔ Delirium/seizures *(looks like sepsis)*
    ➔ Typically anhidrosis
  – Exertional
Environmental Injuries: Heat-Related Illness

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- **Heat stroke**: 2 versions:
  - Classic: elderly, develops more gradually
    - Delirium/seizures (*looks like sepsis*)
    - Typically *anhidrosis*
  - Exertional: younger, rapid onset, high temp
    - Will continue to sweat
Environmental Injuries: Heat-Related Illness

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  - Dizziness, weakness, malaise, N/V, HA, *diaphoresis*
  - Temp: normal - 104F (40C), *normal neuro exam*

- **Heat stroke**: 2 versions:
  - Classic
  - Exertional

**Treatment for heat stroke:**
“evaporate cooling” or “immersion cooling”
Note: antipyretics don’t work
7. A 21-year-old college student presents to the ED with friends who report the student swallowed “a whole bottle” of acetaminophen 1 hour before arrival. They also note the patient has been drinking alcohol. The patient is awake but appears intoxicated.

At this point, you should:

A. Administer syrup of ipecac
B. Perform a gastric lavage
C. Administer activated charcoal
D. Administer N-acetylcysteine (Mucomyst)
Toxicology

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Toxicology
Gastric Decontamination

- **Syrup of ipecac** - No, No, No!!!!!!!
  - AAP says do not keep in home (Pediatrics, Nov 2003)

- **Gastric emptying** - 36-40 Fr tube
  - Possibly helpful if used within 60 min
  - Risk for iatrogenic injury (aspiration, esophagus)

- **Charcoal (best option)**
  - If given < 30 min, decreases absorption by 70%
  - If given 30-60 min, decreases absorption by 30%
  - Dose: 1-2 gm/kg (max 100 gm)
Acetaminophen Toxicity

- Max daily dosing: 4 gm per day, toxic dose = 150 mg/kg
- 2nd most common cause of liver transplantation in US, however, only 4% of those with hepatoxicity develop liver failure
- 4 clinical phases:
  - Phase 1 (0-24 hrs): asymptomatic, nausea/vomiting
  - Phase 2 (18-72 hrs): RUQ abd pain, N/V, rising LFTs
  - Phase 3 (72-96 hrs): Abd pain, N/V, jaundice, encephalopathy, renal failure, death
  - Phase 4 (4 -14 days): resolution
- Acetaminophen levels: drawn at 4 hours after ingestion, treatment based on Rumack-Matthew nomogram
- Treatment: N-acetylcysteine (NAC)
# Toxicology Emergencies

<table>
<thead>
<tr>
<th>Agent</th>
<th>Antidote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>N-Acetylcysteine (Mucomyst)</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Alkaline diuresis</td>
</tr>
<tr>
<td>B-blocker</td>
<td>Glucagon</td>
</tr>
<tr>
<td>Ca-channel blocker</td>
<td>Glucagon</td>
</tr>
<tr>
<td>Digitalis</td>
<td>Fab antibodies (Digibind)</td>
</tr>
<tr>
<td>Heparin</td>
<td>Protamine Sulfate</td>
</tr>
<tr>
<td>Isoniazid (INH)</td>
<td>Pyridoxine (Vit B6)</td>
</tr>
<tr>
<td>Opiates</td>
<td>Naloxone (Narcan)</td>
</tr>
<tr>
<td>Organophosphates</td>
<td>Atropine</td>
</tr>
<tr>
<td>TCA</td>
<td>NaHCO3</td>
</tr>
</tbody>
</table>
Common Toxidromes

#1. Anticholinergic

• **Presentation:**
  – Hot as Hades……..Hyperthermia
  – Blind as a Bat……..Mydriasis
  – Dry as a Bone……..Thirst, decreased salivation
  – Red as a Beet……..Flushing, vasodilation
  – Mad as a Hatter…..Delirium, agitation, confusion

• **Etiology:** Antihistamines, Antiparkinson, Antipsychotics, Antiemetics (phenothiazines), Antidepressants (TCA), Antispasmodics
Common Toxidromes
#2. Serotonin Syndrome

**Presentation:**
- Cognitive-behavior: agitation, anxiety, drowsy, delirium, headache, seizures
- Autonomic dysfunction: tachycardia, arrhythmias, hyperthermia, HTN, diaphoresis, diarrhea, nausea
- Neuromuscular: restlessness, tremor, hyperreflexia, dysarthria, ataxia, myoclonic jerks/twitching

**Etiology:**
- Most common: SSRIs, MAOs
- Especially if combined with: meperidine, cocaine, dextromethorphan, venlafaxine, amphetamine
Serotonin Syndrome: Presentation


## Differences Between Serotonin and Anticholinergic Syndromes

<table>
<thead>
<tr>
<th></th>
<th>Skin</th>
<th>Muscular Tone</th>
<th>Reflexes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Serootonin syndrome</strong></td>
<td>Diaphoretic</td>
<td>Increased</td>
<td>Hyperreflexia</td>
</tr>
<tr>
<td><strong>Anticholinergic</strong></td>
<td>Dry</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td><strong>Neuroleptic malignant syndrome</strong></td>
<td>Diaphoretic, pallor</td>
<td>“Lead pipe” rigid</td>
<td>Bradyreflexia</td>
</tr>
</tbody>
</table>
Toxicology

Treatment for the **serotonin syndrome** is:

**Cyproheptadine** (Periactin)
- Has antiserotonergic properties
- Only available orally
Final Topic: BLS and ACLS

Take-Home Messages:

• Out-of-hospital arrest: think “C-A-B” (no longer A-B-C)
• Compressions: “push hard, push fast”
• V-fib/V-tach - know your algorithm (see next slide)
  – Defibrillate once (not x3) and return to compressions
  – Amiodarone over lidocaine
• Other ACLS meds:
  – Asystole: No atropine
  – SVT meds: adenosine over Ca++ channel blocker
  – Just say “No” to NaHCO3.
V-Fib/Pulseless V-Tach

- Defibrillate x 1

  1. Defibrillate again (x1) and
  2. Give vasopressors (epi or vasopressin)

  5 cycles of CPR, if shockable rhythm

- Defibrillate x 1

  1. Defibrillate again (x1) and
  2. Give antiarrhythmic (amiodarone)

  5 cycles of CPR, if shockable rhythm
Answers

1. A
2. A
3. B
4. C
5. D
6. A
7. C