



## **Arthropod and Assorted Creature-Induced Skin Diseases**

There are various insects, animals, and fish that can cause skin lesions. The lecturer will discuss the various dermatologic problems one might encounter when patient presents with a tick or spider bite, a centipede or scorpion envenomation, or other unexpected bites. The diagnosis and treatment of common ectoparasites such as scabies and lice will also be reviewed.

- Describe the skin lesions associated with various "creature bites," such as ticks, spiders, centipedes, scorpions, and ectoparasites.
- Discuss the appropriate emergency department treatment for these skin diseases.

MO-55  
Monday, October 11, 1999  
5:00 PM - 5:55 PM  
Room # N242  
Las Vegas Convention Center

## **FACULTY**

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**Arthropod Induced Skin Disease MO-55**  
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**11 October 1999**

**OUTLINE:**

**I. Course Description**

1. Cutaneous manifestations from arthropod bites present in many different forms; most often, after the assaulting organism has long disappeared. Arthropod - induced skin disease occurs commonly no matter where one lives, especially since patients today are able to travel throughout the world, making once isolated vector - borne diseases more common in industrialized nations. This presents a challenge to physicians, many of which have little or no training in tropical medicine.
2. This lecture will identify the arthropods associated with transmitting or directly causing diseases that present with skin manifestations. It will review the associated infectious agent and reservoirs, as well as describe their cutaneous presentations and treatment.

**II. Objective**

1. At the conclusion of this lecture, attendees should be able to:
  - a. Identify the arthropods associated with transmitting disease with skin manifestations.
  - b. Name the organism (i.e. bacterium etc.) which is transmitted by the arthropod.
  - c. Identify and describe cutaneous changes that identify it as an arthropod associated disease.
  - d. Select the appropriate medical treatment for the reviewed disease.
  - e. Describe preventive measures for arthropod - induced skin disease.

### III. Course Outline

- A. Definition of Arthropod
- B. Classification of Arthropod
  - 1. Arachnida
  - 2. Insecta
  - 3. Chilopoda
- C. Mechanisms of Disease
  - 1. Venomization
  - 2. Infection
  - 3. Infestation
- D. General cutaneous reactions
  - 1. Urticarial – papular to anaphylaxis
  - 2. Pustular
  - 3. Vesicullo-bullous
  - 4. Edema, erythema, ulcerations
  - 5. Pseudolymphomatous
  - 6. Post-inflammatory
  - 7. other
- D. Arthropod-Induced Skin Diseases

#### By Land:

- 1. Lyme Disease
  - a. vector: *Ixodes scapularis* (Black legged tick)
  - b. infectious agent: *Borrelia burgdorferi*
  - c. reservoir: northeastern, midwestern, pacific US  
and Europe in wild rodents/deer
  - d. skin findings: erythema chronicum migrans
  - e. treatment: prophylaxis (controversial), doxycycline
  - f. additional:
    - i. serologic testing
    - ii. vaccination
- 2. Rocky Mountain Spotted Fever
  - a. vector: *Dermacentor andersoni* (Wood tick), *D. variabilis* (American dog tick)  
*Amblyomma americanum* (Lone star tick)
  - b. infectious agent: *Rickettsia rickettsii*
  - c. reservoir: ticks by transovarian/transstadial passage in all US
  - d. skin findings: maculopapular eruption with petechial component  
on acral locations then spreads to torso
  - e. treatment: A tetracycline or chloramphenicol – AVOID SULFA

3. Ehrlichiosis
  - a. vector: *Ixodes scapularis*, *Amblyomma americanum*
  - b. infectious agent: *E. chaffeensis*
  - c. reservoir: unknown, in US, Central Europe, Russia, Japan, Canada
  - d. skin findings: a generalized erythematous macular or papular eruption  
granulocytic form – 36%, monocytic form – 8%
  - e. treatment: a tetracycline or chloramphenicol
  
4. Plague
  - a. vector: *Xenopsylla cheopis* ( Oriental rat flea),  
*Pulex irritans* (human flea), Squirrel flea
  - b. infectious agent: *Yersinia pestis*
  - c. reservoir: wild rodents (ground squirrel) rabbits, carnivores,  
domestic cats worldwide
  - d. skin findings: buboes – lymphadenitis of nodes draining flea bite site  
ecchymoses and necrosis from secondary DIC
  - e. treatment: streptomycin, gentamycin, tetracyclines, and chloramphenicol
  
5. Tungiasis
  - a. vector: *Tunga penetrans* (Sand flea)
  - b. infectious agent: flea itself
  - c. reservoir: sand
  - d. skin findings: brown papules
  - e. treatment: debridement
  
6. Cat-scratch Fever
  - a. vector: Cat flea (*Ctenocephalides felis*), traumatic scratch from young cat
  - b. infectious agent: *Bartonella henselae*
  - c. reservoir: domestic cats worldwide
  - d. skin findings: granulomatous lymphadenitis and red papule at bite site
  - e. treatment: spontaneous resolution  
or if ill – ciprofloxacin, TMX-SMX, rifampin,  
gentamicin, doxycycline
  
7. American trypanosomiasis
  - a. vector: blood sucking species of Reduviidae (kissing bug)
  - b. infectious agent : *Trypanosoma cruzi*
  - c. reservoir: humans and animals in Central/South America (rare in US)
  - d. skin findings: chagoma, Romano's sign
  - e. treatment: nifurtimox, benznidazole
  
8. Epidemic typhus
  - a. vector: body louse (*Pediculus humanus*)
  - b. infectious agent: *Rickettsia prowazekii*
  - c. reservoir: humans in wartime/overcrowding, Central America
  - d. skin findings: rash similar to RMSF, petechial eruption with fever, but  
starts on torso and spreads to the extremities
  - e. treatment: tetracyclines or chloramphenicol

9. Lice infestations
  - a. skin findings: hair nits, organism, maculae ceruleae
  - b. treatment: topical pediculicides, sulfa antibiotic, ivermectin
10. Scabies/Chiggers
  - a. organism: Scabies - *Sarcoptes scabiei* (Human mite)  
Chiggers - Chigger mite
  - b. skin findings: Scabies - crusted papules to norwegian scabies  
Chiggers - erythematous papulo-vesicular eruption
  - c. treatment: Scabies - permethrin, ivermectin  
Chiggers - topical steroids or topical counter irritants  
(propylene glycol or menthol)
11. Fire Ant envenomation
  - a. organism: Fire Ant (*Solenopsis invecta*)
  - b. venom: Solenopsis D (dialkylpiperdine derivative)
  - c. skin findings: erythematous pustules
  - d. treatment: topical steroids, antihistamines
12. Spider envenomation
  - a. organism: Brown recluse ( *Loxosceles reclusa*))
  - b. venom: 32 Kd sphingomyelinase D
  - c. skin findings: erythematous papule  
central blistering with “red-white and blue” changes  
necrosis
  - d. treatment: controversial – dapsone, ice/elevation,  
antibiotics for secondary infection
13. Scorpion envenomation
  - a. organism: Scorpion (*Centruroides sculpturatus*)
  - b. venom: peptidyl inhibitors of K<sup>+</sup> channels that interfere with neuronal ionic balance
  - c. skin findings: edema and erythema
  - d. treatment: antivenom if systemic symptoms
14. Centipede envenomation
  - a. organism: Centipede (*Scolopendra* sp.)
  - a. Venom: histamine, hyaluronidase, benzokinins, proteinases
  - b. skin findings: erythema, pain and paresis
  - c. treatment: IL steroid/anesthesia

**By Air:**

1. Onchocerciasis
  - a. vector: Black fly (*Simulium*), Buffalo gnat
  - b. infectious agent: *Onchocerca volvulus*
  - c. reservoir: humans in Central America, Africa
  - d. skin findings: onchocercoma – adult worm  
pruritus, dyschromia, blindness - microfilariae
  - e. treatment: ivermectin
2. Leishmaniasis
  - a. vector: Sand fly (*Phlebotomus* and *Lutzomyia* sp.)
  - b. infectious agent: *Leishmania* sp.
  - c. reservoir: humans and rodents in Middle East, Africa, Central America
  - d. skin findings: papule at bite site to indolent ulcer
  - e. treatment: Antimony: stibogluconate or meglumine antimonate or Ampho B
3. Tularemia
  - a. vector: Deer fly (*Chrysops discalis*), ticks, mosquitos
  - b. infectious agent: *Francisella tularensis*
  - c. reservoir: wild animals (rabbits, beaver) in N. America, Mexico, China, Russia
  - d. skin findings: ulceroglandular
  - e. treatment: streptomycin or gentamicin, tetracyclines or chloramphenicol
4. Loiasis
  - a. vector: Deer fly (*Chrysops* sp)
  - b. infectious agent: *Loa loa*
  - c. reservoir: humans in Africa
  - d. skin findings: Calabar or fugitive swelling
  - e. treatment: diethylcarbamazine
5. Dengue Fever
  - a. vector: Mosquito (*Aedes aegypti/albopictus*)
  - b. infectious agent: *Flavivirus*
  - c. reservoir: human - tropical urban centers  
monkey – SE Asia, W. Africa
  - d. skin findings: diffuse maculo-papular dermatitis, petechiae to ecchymoses
  - e. treatment: supportive
6. Elephantiasis (Lymphatic filariasis)
  - a. vector: mosquito (*Aedes*, *Anopheles*, *Culex* sp)
  - b. infectious agent: *Wuchereria bancrofti*, *Brugia malayi*
  - c. reservoir: human in Africa, Asia and Latin America
  - d. skin findings: cutaneous swelling of scrotum and legs with pebble feel
  - e. treatment: Diethylcarbamazine
7. Myiasis
  - a. vector: Human botfly (*Dermatobia hominis*)
  - b. skin findings: moving furuncle (boil)
  - c. treatment: occlusion, surgical excision

8. Bee/Wasp envenomation
  - a. venom: phospholipases, hyaluronidase, cholinesterases
  - b. skin findings: wheal, erythema, pain pruritus
  - c. treatment: supportive

#### **By Sea:**

1. Sea bathers eruption (Marine dermatitis)
  - a. vector: larval forms of marine coelenterates
    - Florida – larvae of thimble jelly fish (*Linuche Unguiculata*)
    - New York – larvae of the sea anemone (*Edwardsiella lineata*)
  - b. skin findings: erythematous macules, papule or wheals under clothed or hairy areas
  - c. treatment: topical steroids, OTC anti-itch preps, oral antihistamines  
removal of suit prior to showering.
2. Swimmer's itch (Clam diggers itch)
  - a. vector: cercarial forms of avian schistosomes (fresh or salt water)
  - b. skin findings: erythematous macules, papules and wheals on uncovered areas
  - c. treatment: topical steroids and oral antihistamines
3. Dracunculosis
  - a. vector: copepods (water fleas) of genus *Cyclops*
  - b. infectious agent: *Dracunculus medinensis*
  - c. reservoir: humans in Africa
  - d. skin findings treatment: subcutaneous migrating worm, skin ulcer
  - e. treatment: surgical excision, diethylcarbamazine, thiabendazole

#### **E. Prevention:**

1. Chemical preparations: DEET (diethyltoluamide), Permanone (permethrin)  
Skin so soft
2. Clothing
3. Vector control

#### **F. References:**

##### **Textbooks:**

1. Benenson, AS. Control of communicable disease in man. 16<sup>th</sup> ed., Amer Pub Health Assoc., Washington, D.C., 1995.
2. Freedberg IM, Eisen AZ, Wolff K, et al. Dermatology in general medicine. 5<sup>th</sup> ed. McGraw – Hill, New York, 1999. (Ch. 239, 240)

##### **Journals**

1. Vetter RS, Visscher PK. Bites and stings of medically important venomous arthropods. *Int Jnl Dermatol* 1998;37:481-496.
2. Caumes E, Carriere J, Guermonprez G, et al. Dermatoses associated with travel to tropical countries: A prospective study of the diagnosis and management of 269 patients presenting a tropical disease unit. *Clin Inf Dis* 1995;20:542-8.

3. Meinking TL. Infestations. *Curr Prob Dermatol* 1999;11:73-120.
4. Brown SL, Hansen SL, Langone JJ. Role of serology in the diagnosis of lyme disease. *JAMA* 1999;282:62-80.
5. Burkhart CG, Burkhart CN, Burkhart KM. An assessment of topical and oral prescription and treatments for head lice. *J Am Acad Dermatol* 1998;38:979-82.
6. Garcia LS. Classification of human parasites, vectors and similar organisms. *Clin Inf Dis*. 1993;16:614-5.
7. Uspensky I. General principles of protecting people from arthropod pests. *Ann New York Acad Sci*. 1992;661:229-35.
8. Mohri S, Sugiyama A, Saito K, Nakajima H. Centipede bites in Japan. *Cutis*. 1991;47:189-90.
9. Binder LS. Acute arthropod envenomation. Incidence, clinical features and management. *Med Tox Adv Drug Exp*. 1989;4:163-73.
10. Burnett JW, Calton, Morgan RJ. Centipedes. *Cutis*. 1986;37:241.
11. Burnham G. Onchocerciasis. *Lancet* 1998;351:1341-6.
12. Shapiro ED. Tick-borne disease. *Adv Ped Inf Dis* 1997;13:187-218.
13. Fisher RG. Index of suspicion. Case 2. Diagnosis: ucleroglandular tularemia. *Ped Rev* 1996;17:221-3.
14. Anonymous. Human plague in 1996. *Weekly Epid Rec* 1998;73:366-9.
15. Gambel JM, Brundage JF, Kuschner RA, Kelley PW. Depolyed US army soldiers' knowledge and use of personal protection measures to prevent arthropod related causalities. *Jnl Travel Med* 1998;5:217-20.
16. Martin S, Gambel J, Jackson J, et al. Leishmaniasis in the United States military. *Mil Med* 1998;163:801-807.
17. McKinaly JR, Ross EV, Barrett TL. Vesiculo-bullous reaction to diethyltoluamide revisited. *Cutis*. 1998;62:42-3.
18. Mehr ZA, Rutledge LC, Echano NM, et al. US Army soldiers' perception of arthropod pests and their effects on military missions *Mil Med* 1997;162:804-7.
19. Silber JL. Rocky Mountain Spotted Fever. *Clin Dermatol* 1996;14:245-58.
20. Dennis DT, Hughes JM. Multidrug resistance in plague. 1997;337:702-4.
20. Anonymous. Fatal Human Plague- Arizona and Colorado, 1996 *MMWR* 1997;46:617-20.
21. Azad AF, Beard CB. Rickettsial pathogens and their arthropod vectors. *Emerg Inf Dis* 1998;4:179-86.
21. Chadee DD. Tungiasis among five communities in south western Trinidad, West Indies. *Ann Top Med Parasitol* 1998;92:107-13.



22. Chang DK, Schloss E, Jimbow K. Well's syndrome: vesicullo-bullous presentation and the possible role of ectoparasites. *Int Jnl Dermatol* 1997;36:288-91.
23. Lowry MA, Ownbey JL, McEvoy PL. A case of tungiasis. *Mil Med* 1996;161:128-9.
24. Higgins JA, Radulovic S, Jaworski DC, et al. Acquisition of the cat scratch disease agent *Bartonella henselae* by cat fleas. *Jnl Med Entomol* 1996;33:490-5.
25. Anonymous. Imported dracunculosis- United States, 1995 and 1997. *MMWR* 1998;47:209-11.
26. Molyneux DH. Vector-borne parasitic disease – an overview of recent changes. *Int Jnl Parasitol* 1998;28:927-34.
27. Conte JE Jr. A novel approach to preventing insect-borne disease. *N Eng Jnl Med* 1997;337:785-6.
28. Dawes M, Hicks NR, Fleminger M, et al. Evidence based case report: treatment of head lice. *BMJ* 1999;318:385-6.
29. Gubler DJ. Dengue and dengue hemorrhagic fever. *Clin Microbiol Rev* 1998;11:480-96.
30. Trofa AF, DeFraites RF, Smoak BL. Dengue fever in US military personnel in Haiti. *JAMA* 1997;277:1546-8.
31. Davidson RN. Practical guide for the treatment of Leishmaniasis. *Drugs* 1998;56:1009-18.
32. Meinking TL, Taplin D, Hermida JL, et al. The treatment of scabies with ivermectin. *N Eng Jnl Med* 1995;333:26-30.
33. Otttesen EA, Duke BO, Karam M, et al. Strategies and tools for the control/elimination of lymphatic filariasis. *Bull World Health Org* 1997;75:491-503.
33. Rahn DW, Felz MW. Lyme Disease update. Current approach to early, disseminated and late lyme disease. *Postgrad Med* 1998;103:51-4.
34. Sigal LH, Zahradnik JM, Lavin P, et al. A vaccine consisting of recombinant *Borrelia burgdorferi* outer-surface protein A to prevent lyme disease. Recombinant outer-surface protein A lyme disease vaccine study consortium. *N Eng J Med* 1998;339:216-22.
35. Steere AC, Sikand XK, Meurice F, et al. Vaccination against Lyme disease with recombinant *Borrellia burgdorferi* outer-surface protein A adjuvant. Lyme disease vaccine study group. *N Eng Jnl Med* 1998;339:209-215.
36. Nadel RB, Wormser GP. Lyme borreliosis. *Lancet* 1998;353:557-65.
37. Lucchina LC, Ilson ME, Drake LA. Dermatology and the recent traveler; infectious disease with dermatologic manifestations. 1997;36:167-81.
38. Johnston M, Dickinson G. An unexpected surprise in a common boil. *Jn Emer Med* 1996;14:779-81.
39. Smith GA, Sharma V, Knapp JF, et al. The summer penile syndrome: seasonal acute hypersensitivity reaction caused by chigger bites on the penis. *Ped Emer Care* 1998;14:116-8.

40. Taplin D, Meinking TL. Treatment of HIV-related scabies with emphasis on the efficacy of ivermectin. *Semin Cut Med Surg* 1997;16:235-40.
41. Koh WL. When to worry about spider bites. Inaccurate diagnosis can have serious, even fatal, consequences. *Postgrad Med* 1998;103:235 thru 250.
42. Anderson PC. Spider bites in the United States. *Dermatol Clin* 1997;15:307-11.
43. Annala IT, Karjalainen ES, Annala PA, et al. Bee and wasp sting reactions in current beekeeper. *Ann All Asthma Immunol* 1996;77:423-7.
43. Bischof RO. Seasonal incidence of insect stings: autumn 'yellow jacket delirium'. *Jnl Fam Pract* 1996;43:271-3.
44. Kumar S, Hlady WG, Malecki JM. Risk factors for sea bather's eruption: a prospective cohort study. *Public Health Reports* 1997;112:59-62.
45. Kemp D. Bites and stings of the arthropod kind. Treating reactions that range from annoying to menacing. *Postgrad Med* 1998;103:88 thru 102.
46. Holve S. Treatment of snake, insect, scorpion and spider bites in the pediatric emergency Department. *Curr Opin Peds* 1996;8:256-60.
47. Carbonaro PA, Janniger CK, Schwartz RA. Scorpion sting reactions. *Cutis* 1996;57:139-41.