Chapter 12

Dermatology

This chapter describes dermatologic situations that may be encountered in the wilderness. After reading this chapter you should be able to:

- Recognize poison oak, poison sumac, and poison ivy.
- Describe prevention and treatment of poison ivy contact dermatitis.
- Describe the recommendations for avoiding sunburn
- Understand the proper use of sunscreen lotion
- Understand the treatment of sunburns
- Describe dermatologic conditions in which evacuation to definitive medical care are necessary
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Case 1

A 45 year-old woman takes her hiking boots out of storage and joins some friends for a day hike in the early spring. After returning home from a pleasant, uneventful trip she develops an unrelenting itch on her right lower leg that subsequently develops significant redness. The symptoms remind her of a rash she had last fall after hiking through some dried brush. Strangely, the rash even seems to be in the same location on the same leg. Last fall she had been diagnosed with poison ivy allergic dermatitis, but this time she had hiked on an asphalt trail and had not brushed against any plants.

1. What caused the rash last fall?
2. Assuming she encountered no poison ivy on today’s hike, what is causing the rash today?
3. How would you clean her boots to prevent future reactions?
4. How would you manage her current symptoms?

Case 2

A middle aged potato farmer is attempting to rid his field of the poison ivy that has caused him numerous outbreaks in the past. He builds a large fire and gathers trash, dead wood, and shrubs. He takes special care with the shrubs and handles them with thick vinyl gloves to prevent an outbreak. As he feeds the shrubs into the fire he starts to develop some wheezing, and progressive respiratory difficulty.

1. What is causing his respiratory distress?
2. How is he contacting the allergen?
3. What is the emergent treatment for his condition?

Case 3

A 17 year-old boy is rock climbing in the desert with some friends. After lunch he is warm and removes his shirt while the group continues rock climbing through the afternoon. That night he has severe pain, warmth, and redness on his back. The pain is worsened with contact, even contact with clothing.

1. What would have been the best prevention of his rash?
2. What treatments could relieve his symptoms?
3. What are the short term and long term outcomes of his sunburn?
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Poison Ivy

Poison Ivy: demonstrating the classical “leaves of three” appearance
(Photo courtesy of www.poison-ivy.org)

Poison Oak

Poison Oak: with serrated edges easily confused with typical oak
(Photo courtesy of www.poison-ivy.org)
Poison Sumac

Poison Sumac: this deceptively attractive shrub is most commonly found in swampy regions

(Photo courtesy of www.poison-ivy.org)

Poison Ivy Rash

Poison Ivy Rash: scratching with resin under the fingernails may cause the rash to appear in a linear pattern

(Photo courtesy of www.poison-ivy.org)
Toxicodendrons

Background

Facts

- Poison Ivy, poison oak, and poison sumac belong to a genus of plants called toxicodendrons.
- Toxicodendrons grow in every state except Hawaii and Alaska.
- Poison oak, poison sumac, and poison ivy all contain a toxic resin called urishiol which is responsible for the characteristic reaction.
- Urichiol is contained within the leaves, fruit, root, and stem of the plant.
- Urichiol does not cause contact dermatitis unless trauma to the plant releases the resin, but trauma as simple as drying in the fall, or raindrops can release the resin.
- Urichiol is remarkably adhesive and can cling to pets, garden tools, and clothing.
- Urichiol is quite heat stable and can attach to smoke particles when the plants are burned, making the potential for airway reactions a frightening possibility.
- The toxin is also very enduring with reports of the resin causing allergic contact dermatitis years after it has left the original plant.
- 85% of the population will develop an allergic reaction if exposed to poison ivy, oak, or sumac.
- Rash may appear after the first exposure, but on subsequent exposures the reaction is more pronounced and has a faster onset.
- Those with extreme Poison Ivy sensitivity may also cross react to mangoes.

The Toxicodendrons

- Poison Ivy (Toxicodendron radicans/rydbergii) is a climbing vine with three serrated-edged, pointed leaves which grows in the east, midwest, and south. The three leaf clusters have given rise to the popular adage “Leaves of three: let them be.” In the northern and western states, Poison Ivy is more commonly seen as a low-growing shrub, still with the characteristic three-leaf clusters.
- Poison Oak (Toxicodendron toxicarium/diversilobum) also has three leaves. It grows in the sandy soil of the southeast as a small shrub. In the western United States Poison Oak is a very large plant which grows as a standing shrub or climbing vine.
- Poison Sumac (Toxicodendron vernix) is a shrub or bush with two rows of 7 - 13 leaflets. It is most common in the peat bogs of the northern United States and in swampy southern regions of the country.

Poison Ivy

Pathophysiology

- Toxicodendron dermatitis is a type IV hypersensitivity reaction.
- Urichiol contacts the skin after direct encounter or contact through a secondary host (a pet, a piece of clothing, etc).
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- Once urushiol contacts the skin it seeps through the protective epidermal level.
- The toxin is detected by antigen presenting cells that migrate to the lymph nodes and activate T cells. The cytotoxic T cells mount an attack that leads to the vasodilation and characteristic tissue response at the site of skin contact.
- Once an exposure has caused formation of clonal T Lymphocytes, a subsequent exposure may cause a more rapid response.

Clinical Presentation

- The most common clinical presentation of toxicodendron exposure is a pruritic erythematous rash on an exposed part of the body.
- The rash often includes fluid-filled vesicles or bullae in a linear arrangement.
- The linear arrangement has led to the misconception that rupturing the fluid-filled vesicles while scratching causes spread of the reaction. In fact the clusters are due to the area contacted by the toxicodendron.
- The vesicles do not contain urushiol and rupture of the vesicles does not spread the disease.
- In a first time exposure the appearance of skin lesions is commonly within 24 to 48 hours, but may be delayed up to 21 days.
- In a sensitized patient, rash appears between 4 to 96 hours after exposure
- The time of onset of rash can be difficult to describe because urushiol can cause a rash both due to contact irritation, and allergic response.
- A small minority of the population are considered “exquisitely sensitive” to urushiol. These patient will develop the typical pruritis, erythema, vesicles and bullae within 6 hours of exposure. Systemic signs such as fever may also appear. These patients need immediate treatment.

Treatment

Prevention

- Avoidance of the toxicodendrons is the surest prevention of poison-ivy contact dermatitis. Full length clothing helps prevent direct contact with the plants, but the urushiol resin can soak through protective clothing.
- Barrier creams such as Bentoquam, Linoleic acid dimers, and barrier ointments have been marketed to prevent poison ivy contact dermatitis. These creams have varying efficacy and must be reapplied every few hours to maintain protection. Bentoquatam (Ivy Block) is safe and is probably the most well studied of these products. It prevents dermatitis in 68% of exposures, but like the other creams, it must be applied to the skin every four hours to maintain protection.

Early Treatment

- Wash the Area: a person with average allergic response can prevent immune reaction by washing off the resin within 1-4 hours
- Rinsing with copious amounts of cold water will help remove the resin without opening pores and enhancing adsorption into the skin. Mild hand soaps and non abrasive rubbing is also recommended.
Rubbing alcohol on a cotton applicator is effective at removing the urushiol resin both from skin and from tools and clothing. Take care to avoid reusing the cotton to prevent spread of the resin. When cleansing, take special care to remove resin from the fingernails to prevent further inoculation when scratching.

**Mild Disease**

- Mild dermatitis involves minimal exposure to urishiol causing small eruptions on the skin.
- If available, the use of high potency topical steroid creams before the formation of vesicles will offer relief and blunt the allergic response.
- Avoid use of high potency steroids on the face, genitals, and other areas of thin skin.
- After vesicles have formed topical steroids may not change the course of the allergic response, but can relieve itching.
- Symptomatic relief of the itching can be gained either by using oral diphenhydramine (25-50mg), or an equivalent dose of non sedating antihistamines.
- Several other products are marketed for topical relief of poison ivy dermatitis. The skin irritation can be soothed with calamine lotion, or soaks in Aveeno oatmeal baths.
- Aluminum acetate (Burrow’s solution) or Domeboro astringent solution may be applied to dry weeping vesicles for relief of pruritus.
- Topical antibiotics and topical antihistamines should be avoided because these substances have a history of causing allergic dermatitis themselves and may complicate the irritation without offering any advantage.

**Moderate Disease**

- Moderate contact dermatitis affects larger surface areas and causes significant distress.
- Treatment should include topical steroids if given the opportunity to treat before vesicle formation.
- After vesicle formation, relief may be obtained by oral Prednisone 60mg daily for 5 dys then 40mg daily for 5 days, then 20 mg daily for 5 days.
- Short course prednisone therapy may cause a rebound dermatitis and should be avoided.
- Symptomatic treatment as in mild disease is also appropriate.

**Severe Disease**

- Any reaction that causes airway or genital swelling or involves a large amount of body surface should be considered severe disease and requires hospital care.
- IV steroid therapy with Methylprednisolone can prevent or significantly diminish the immune flare if patients present within two hours of exposure.
- If patients present after this time then the IV steroids must be followed by oral therapy as described above.

**Disease Course**

- Most cases of poison ivy contact dermatitis are self-limiting and will resolve in 1 to 3 weeks without any treatment.
- The vesicles will eventually rupture, crust over, and then heal.
- The most common complication of toxicodendron exposure is secondary infection at the site of the lesion with Staphylacoccus or Streptococcus skin flora.
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Evacuation Guidelines

The majority of cases of toxicodendron allergic dermatitis can be adequately managed in the field. The exception would be the exquisitely sensitive patient who develops severe allergic response or any exposure that involves the face, airway, or genital areas. Any patient showing signs of respiratory difficulty, urine outflow obstruction, or large body surface exposure with severe reaction should be considered critical. These patients should be evacuated to definitive medical care.

Sunburn

Background

Facts

- Sunburn is inflammation of the skin that is caused by overexposure to the sun.
- Sunburn is not only uncomfortable, but because it predisposes to skin cancer—is also dangerous.
- Ultraviolet (UV) rays from the sun cause sunburn.
- Roughly 32 percent of adults and 80 percent of young people report at least one sunburn in the previous year.
- Skin cancer is a serious health problem in the United States, affecting almost a million Americans each year. About 7,000 people will die each year of malignant melanoma.
- ‘‘Tanning’’ is UV exposure just like any other sunburn and confers the same risk of skin cancer. This includes tanning-bed UV exposure.
- Fair-skinned people are most susceptible to sunburn, because their skin produces only small amounts of the protective pigment, Melanin, and while they have a lower risk, even the darkest-skinned people can develop skin cancer.

Pathophysiology

- Two types of UV rays are clinically important in sun exposure: UVA and UVB.
- UVA rays penetrate the skin deeply and contribute to sunburning and cancer risk, but UVB rays—which act upon the skin more superficially--play the largest role in sunburn formation and wrinkling.
- There are no ‘‘safe’’ UV rays.
- UV rays strike the skin and cause multiple effects. Skin redness appears as the local blood vessels dilate and inflammatory substances (including histamine) are released.
- The tissue changes become apparent as redness develops over a period of 2 to 6 hours after exposure.
- The ultraviolet rays also strike the cell DNA causing damage that may ultimately result in failure of the cell to self-regulate leading to cancer.
Clinical Presentation

- A sunburn is generally a clinically obvious diagnosis with redness in the sun-exposed areas.
- Symptoms can vary from mild redness and warmth of the skin to severe pain and blistering.
- The traditional classification of sunburn includes first degree and second degree sunburns.
- First degree sunburns are those with redness and pain that may peel, but heal within a few days.
- Second degree sunburns also have redness and pain but may also have blisters and cause larger systemic symptoms such as fever, chills, and headache.

Treatment

Prevention

- Measures to limit sun exposure will prevent sunburn and its associated risks. Limit sun exposure to early in the day, trying to keep contact initially under 15 minutes.
- Avoid the sun between 10 a.m. and 4 p.m. The sun is more direct during these times.
- Use waterproof sunscreen on legs and feet since the sun can burn even through water.
- Wear an opaque shirt in the water because reflected rays are intensified.
- Wear breathable full-length clothing, use wide-brimmed hats, and seek shade.
- When the sun cannot be avoided, sunscreen should be worn.
- Everyone six months of age and older should use sunscreen. Infants younger than 6 months of age should be kept out of the sun because their skin is thin and susceptible to burning. Sunscreens have not been approved for infants.
- Traditionally, sunscreens have contained the chemical PABA which screens UVB rays but not UVA rays. Newer broad spectrum sunscreens contain additives that also protect against the UVA rays.
- Sunscreens with ingredients such as benzophenones (oxybenzone), cinnamates (octylmethyl cinnamate and cinoxate), zinc oxide, avobenzone, sulisobenzone, salicylates, and titanium dioxide provide the broad spectrum protection against UVA rays.
- Sunscreen should be applied to dry skin 30 minutes before sun exposure.
- Sunscreen must be reapplied after two hours, or sooner if sweating or swimming. Even waterproof sunscreen loses effectiveness after about 80 minutes.
- Sunscreens are rated according to their Sun Protection Factor (SPF). SPF compares the time to sunburning compared to no protection. Wearing a sunscreen with an SPF of 2, a person who normally sunburns after 5 minutes without protection, would take twice that long (10 minutes) to develop a sunburn. That same person, if wearing SPF 10 lotion, would take 50 minutes to burn.
- The American Academy of Dermatologists recommend the use a waterproof sunscreen with an SPF of at least 15.

First Degree Sunburns

- First degree sunburns involve a limited surface area with symptoms of skin redness and pain.
- The mainstays of therapy are pain control and skin care.
- Pain control can be achieved with Tylenol or with NSAID’s such as ibuprofen. Diphenhydramine may also offer relief from itching and help the patient sleep.
- Skin treatment can include any of the following measures that offer relief.
  - Cool soaks with water or moisturizers such as aloe vera
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- Topical pain relief with Aveeno lotion, Prax lotion, or Sarna lotion
- Low potency topical steroids.

- First degree sunburns are uncomfortable, and may cause superficial skin peeling, but they heal within a few days

**Second Degree Sunburns**

- Second degree sunburns also have redness and pain but are more extensive, have blisters, and may cause larger systemic symptoms such as fever, chills, and headache.
- In addition to the therapies for first degree sunburns, these patients may require stronger pain medications.
- Use of systemic steroids in severe sunburns has anecdotal and traditional support, but has not been well studied.
- Moderately burned skin should heal within a week, but even one bad burn in childhood carries an increased risk of skin cancer.

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Evacuation Guidelines

If a large body surface area is involved: if systemic symptoms such as fever, chills, and headache are present or if pain cannot be controlled then the patient should be considered critical and evacuated to definitive care.

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**Questions**

1. **Poison Ivy contact dermatitis can be caused by exposure to:**
   - The green leaves during summer
   - The dried leaves during the fall.
   - The stem
   - The root
   - All of the above

2. **Appropriate treatment of poison ivy contact dermatitis includes:**
   - Topical steroids creams
   - Topical antibiotic creams
   - Soaks to relieve itchiness
   - Topical antihistamines
   - A and C
   - B and D
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3. Indications for evacuating a person with poison ivy contact dermatitis include:
   a. Involvement of the hands, feet, or legs
   b. Involvement of the face or genitals
   c. Previous exposure to poison ivy
   d. Airway involvement
   e. A and C
   f. B and D

4. Which of the following are true of Urushiol?
   a. It has seasonal effect, causing symptoms in the fall but not in the spring
   b. It can attach to smoke molecules when burned
   c. It is the active resin in Poison Ivy, and Poison Sumac, but not in Poison Oak.
   d. It readily clings to tools, pets, and clothing
   e. A and C
   f. B and D

5. Which of the following are true of UV light exposure:
   A. UVB rays cause sunburn, but UVA rays are harmless.
   B. UV rays from tanning beds are not harmful
   C. UV exposure causes cell damage that can lead to cancer
   D. UV rays are not a concern on cloudy days

6. If a fair skinned woman normally sunburns after 10 minutes in the sun, how long will she take to develop the same level of sunburn when wearing sunscreen (SPF 15)?
   a. 3.3 minutes
   b. 150 minutes
   c. 30 minutes
   d. 1500 minutes

Answers:
   1. e
   2. e
   3. f
   4. f
   5. c
   6. b