CHAPTER 110

Dermatologic Presentations

Catherine A. Marco

OVERVIEW

Principles

Background

Skin conditions are common reasons for seeking emergency care.[1,2] Diseases of the skin and subcutaneous tissue account for over 5 million emergency department (ED) visits annually, which is roughly 4% of all ED visits.[3] The entire spectrum of severity of dermatologic disorders may be encountered from life-threatening to minor conditions. Common diagnoses among ED patients include infections, inflammatory conditions, allergic reactions, and drug reactions.

Anatomy and Physiology

The skin is composed of three layers: the epidermis, dermis, and subcutaneous layer. The epidermis is a thin layer of stratified squamous epithelium, consisting mainly of keratinocytes, which progress through stages of differentiation as they migrate from the basal to the superficial layer. These layers are the stratum germinativum (base of the epithelium), stratum spinosum, stratum granulosum, and stratum corneum (superficial layer). The epidermis also includes other cells, such as melanocytes and Langerhans cells. Melanocytes produce melanin, which functions to add pigment to the skin and also to absorb ultraviolet radiation. Langerhans cells are a component of the immune system and function to ingest and process foreign antigens. The epidermis lacks direct blood supply and is dependent on the dermis for nutrients by diffusion through the dermal-epidermal junction. This junction is the site of immunologic injury resulting in bullae in conditions, such as bullous pemphigoid and epidermolysis bullosa.

The dermis consists of connective tissue, blood vessels, lymphatic vessels, nerve endings, and immune cells. The main function of the dermis is to support the epidermis and contribute to the protective functions of the skin. Fibroblasts produce procollagen and elastic fibers used to form the connective tissues that give support and elasticity to the skin. Sweat glands and the network of blood vessels in the dermis assist with thermoregulation.

The subcutaneous layer is composed of connective tissue and adipose tissue, functions to cushion the overlying skin, and contains lymph and neurovascular structures.

The skin serves several important physiologic functions. It serves as a barrier between the internal and external environment. The skin protects from external toxic and infectious materials, and assures that internal fluids and electrolytes are maintained in homeostasis; it serves an integral role in temperature homeostasis through its barrier function, sweating mechanism, and blood vessel dilation or constriction; it functions in the absorption of ultraviolet radiation and production of vitamin D; sensory nerve endings in skin serve important functions of sensation; and finally, certain cells within the skin serve important immunologic functions, including Langerhans cells, lymphocytes, mast cells, and keratinocytes.

Clinical Features

A general approach to the unknown rash is listed in Box 110.1.

Important historical information includes the time of onset, duration of symptoms, and relation to any new potential allergens, such as foods, medications, soaps, pets, jewelry, and so on. Information about changes over time should be sought, including whether the rash has progressed, improved, or waxed and waned. Associated pain, pruritus, fever, sexual history, occupation or hobbies should be identified. Relevant past medical history includes medical conditions, skin conditions, medications, illicit drug use, allergies, recent travel, sunlight exposure, and family history.

The physical examination is essential to identifying the cutaneous diagnosis. The examination should be performed with adequate lighting. Primary and secondary lesions, as well as characteristics and patterns of lesions should be identified. Lesions may be palpated wearing gloves to identify texture, blanching, or sloughing characteristics. Nikolsky's sign may be tested, and when positive, gentle rubbing of the skin results in sloughing of the top layer of the epidermis. For patients with systemic complaints, a thorough visual examination from head to soles of feet should be performed, including skin, mucosa, and genitalia.

Identification and description of lesions is essential. Lesions may be classified as primary or secondary lesions. Primary lesions arise directly as a result of the disease process. Secondary lesions result from subsequent factors, such as scratching, treatment, healing, or complicating infections. Primary and secondary lesions and descriptions are listed in Tables 110.1 and 110.2. The significance of distribution of lesions is outlined in Table 110.3.

Diagnostic Testing

Laboratory testing is unnecessary for most patients with a rash. Specific tests for clinically suspected diseases may be indicated, such as blood tests for secondary syphilis, heterophile antibodies (monospot) for mononucleosis, or throat swabs for rapid testing and culture of group A streptococcus. Adjunctive skin tests may be considered, including potassium hydroxide (KOH) prep, Tzanck smear, gram stain, erythrocyte sedimentation rate (ESR), or biopsy. For the patient with severe systemic illness, a complete blood count, blood cultures, lumbar puncture studies, electrolytes, blood urea nitrogen (BUN), creatinine, glucose, and liver function tests should be considered.

Management

Treatments for dermatologic conditions should address both definitive treatment for underlying disease states and symptomatic treatment. If causative agents are identified, they should be discontinued or eliminated from the environment. Topical or systemic therapies may be indicated for a variety of conditions.

Vehicles for topical dermatologic preparations may be important in the therapeutic effect.[4] Vehicles include creams (water-based emulsion of oil), lotions (water-based suspension of

BOX 110.1

Approach to Management of the Unknown Rash

1. Time of onset
2. Historical features
3. Medical history
4. Primary lesion
5. Secondary lesions
6. Distribution of the lesions
7. Systemic illness
8. Diagnostic tests
9. Category of rash
   a. Infectious
   b. Immune
   c. Vascular
   d. Allergic
   e. Malignancy
10. Treatment

TABLE 110.1

Primary Lesions

LESION	DESCRIPTION	SIZE
Macule	Flat circumscribed pigmented area	<0.5 cm in diameter
Patch	Flat circumscribed pigmentation area	>0.5 cm in diameter
Papule	Elevated, solid, palpable lesion, variable color	<0.5 cm in diameter
Plaque	Elevated, solid, palpable lesion, variable color	>0.5 cm in diameter
Nodule	Solid, palpable, subcutaneous lesion	<0.5 cm in diameter
Abscess	Erythematous, fluctuant, tender, fluid-filled nodule	Any
Tumor	Solid, palpable, subcutaneous lesion	>0.5 cm in diameter
Vesicle	Elevated, thin walled, circumscribed, clear fluid-filled lesion	<0.5 cm in diameter
Pustule	Elevated, circumscribed, purulent fluid-filled lesion	Any
Bulla	Elevated, thin walled, circumscribed, fluid-filled lesion	>0.5 cm in diameter
Petechiae	Flat, erythematous or violaceous non-blanching lesions	<0.5 cm in diameter
Purpura	Erythematous or violaceous non-blanching lesions, may be palpable	>0.5 cm in diameter

powder), ointments (oil-based suspension, which improves penetration of the active ingredient), gels (transparent, semi-solid, non-greasy emulsion), foams (helpful for scalp or difficult to reach areas), and pastes (ointment base with powder, stiff consistency). For dry, scaly conditions, emollients such as ointments may be more effective. For moist conditions, a dryer vehicle such as a gel or powder may be preferable. Vehicle components may vary with generic preparations, and it is important to monitor clinical success if generic preparations are prescribed. Communication with the patient about preferences may be important. Patient preference and compliance are closely linked to successful outcomes.

TABLE 110.2

Secondary Lesions

SECONDARY LESION	DESCRIPTION
Scale	Thickened area of keratinized epithelium
Crust	Dried area of plasma proteins, resulting from inflammation
Fissures	Deep cracks in skin surfaces, extending into dermis
Erosions	Disruption of surface epithelium, usually linear, traumatic
Ulcer	Deep erosion extending into dermis
Scar	Dense collection of collagen, a result of healing after trauma or procedures
Excoriation	Linear erosions typically secondary to scratching or rubbing
Infections	Bacterial, viral, fungal, or protozoal infection, caused by breaks in dermal-epidermal junction, often erythematous
Hyperpigmentation	Increase in melanin containing epidermal cells
Lichenification	Abnormally dense layer of keratinized epidermal cells

TABLE 110.3

Distribution and Patterns of Selected Disease States

DERMATOLOGIC DIAGNOSIS	DISTRIBUTION AND PATTERNS OF LESIONS
Atopic dermatitis, infantile	Face, scalp, flexor surfaces of extremities
Atopic eczema, adult	Face, neck, flexor surfaces of extremities
Dermatomyositis	Dorsal MCP joints, periorbital area
Disseminated gonorrhea	Distal extremities, near joints
Erythema nodosum	Anterior shins, ulnar surfaces
Herpes zoster infection	Dermatomal distribution, common on trunk
Lichen planus	Wrists, ankles, flexor surfaces
Nummular eczema	Distal extremities
Neurotic excoriations	Extremities, face, upper back, neck
Pityriasis rosea	Trunk, extremities, "Christmas tree" pattern
Porphyria cutanea tarda	Sun-exposed areas, hands, forearms, feet
Psoriasis	Extensor surfaces of extremities, sacral area
Rosacea	Face, neck
Sarcoidosis	Face, extremities, back
Seborrheic dermatitis	Chest, nasolabial folds
Secondary syphilis	Torso, palms, soles
Systemic lupus erythematosus	Nose and cheeks, head and neck, photosensitivity, alopecia
Tinea versicolor	Upper back and chest

MCP, Metacarpophalangeal.

Topical steroids are commonly used to treat inflammatory dermatologic conditions. Topical steroids have several mechanisms of action, including antiinflammatory effects, antiproliferative effects on fibroblasts and collagen, reduction of leukocyte adhesion to capillaries, reduction of capillary wall permeability, reduction of complement components, and histamine antagonism. Adverse effects may include skin atrophy, striae, acneform lesions, pigment changes, telangiectasia, hypothalamic-pituitary axis suppression from systemic absorption, and exacerbation of certain conditions such as fungal infections and viral infections. Topical steroids should be prescribed in the lowest potency and for the shortest duration that is effective for the individual patient. Systemic therapies are appropriate for systemic conditions. Commonly used systemic therapies include oral, intramuscular (IM), or intravenous (IV) steroids, antipruritic agents, antibiotics, antifungal agents, and antiviral agents.

Disposition

Most ED patients with dermatologic complaints can be successfully managed as outpatients. Indications for inpatient hospitalization include systemic disorders with dehydration, disorders of thermoregulation, systemic infection or other systemic disorder requiring inpatient management, and inability to care for self or maintain appropriate oral intake. Dermatologic outpatient follow-up or inpatient consultation may be appropriate.

INFECTIOUS DISORDERS

Bacterial Infections

Impetigo

Impetigo is typically caused by *Staphylococcus aureus* and/or β-hemolytic *Streptococcus.* Pediatric patients are commonly affected. Streptococcal impetigo (ecthyma) is found most often on the face and other exposed areas. The eruption often begins as a single pustule but later develops multiple lesions. It begins as 1- to 2-mm vesicles with erythematous margins. When these break, they leave red erosions covered with a golden yellow crust (Fig. 110.1). Lesions may be pruritic but usually are not painful. Regional lymphadenopathy is commonly present. Lesions are contagious among infants and young children and less so in older children and adults. Postpyodermal acute glomerulonephritis is a recognized complication of streptococcal impetigo.

Staphylococcal impetigo is differentiated from streptococcal impetigo in that it is more superficial, and there is little surrounding erythema. Other diagnostic considerations are herpes simplex virus (HSV) and inflammatory fungal infections. A Gram stain of the weepy erosion obtained after removal of the crust will reveal gram-positive cocci. Methicillin-resistant *Streptococcus aureus* (MRSA) impetigo is increasingly common. Risk factors include prior infection or colonization with MRSA.[5]

Bullous impetigo is caused by the toxin released by staphylococcus. It is seen primarily in infants and young children. The initial skin lesions are thin-walled, 1- to 2-cm bullae (Fig. 110.2). When these rupture, they leave a thin serous crust and collarette-like remnant of the blister roof at the rim of the crust. The face, neck, and extremities are most often affected. The differential diagnosis includes contact dermatitis, HSV infection, superficial fungal infections, and pemphigus vulgaris. A Gram stain of the fluid from a bulla reveals gram-positive cocci. Cultures are positive in 95% of cases.

Empirical therapy should be instituted with oral or topical antibiotics. Oral antibiotics are indicated for severe or multiple lesions. Topical therapies include either mupirocin or retapamulin. Oral therapies include be a regimen with an agent active against *S. aureus,* such as dicloxacillin or cephalexin. If MRSA is suspected, doxycycline, clindamycin, or trimethoprim-sulfamethoxazole (TMP-SMX) is recommended.

Therapy for bullous impetigo consists of a systemic antibiotic, such as dicloxacillin, erythromycin ethylsuccinate, or azithromycin. Without treatment, impetigo generally heals within 3 to 6 weeks.

Folliculitis

Folliculitis is an inflammation in the hair follicle, usually caused by *S. aureus.* It appears as pustules with a central hair. The lesions are usually on the buttocks and thighs, occasionally in the beard or scalp, and may cause mild discomfort. The differential diagnosis includes acne, keratosis pilaris, and fungal infection. Gram-negative folliculitis with *Pseudomonas aeruginosa* can occur after exposure to infected hot tubs and swimming pools or in individuals taking antibiotics for acne; it can be differentiated from staphylococcal folliculitis by a Gram stain of the lesion.

Treatment with an antiseptic cleanser such as povidone-iodine or chlorhexidine every day or every other day for several weeks is usually adequate. For patients with extensive involvement, a course of systemic antibiotics may be added, such as doxycycline or dicloxacillin.

Cellulitis

Cellulitis presents with localized erythema, swelling, and pain of the soft tissues (Fig. 110.3). Erysipelas is a streptococcal infection

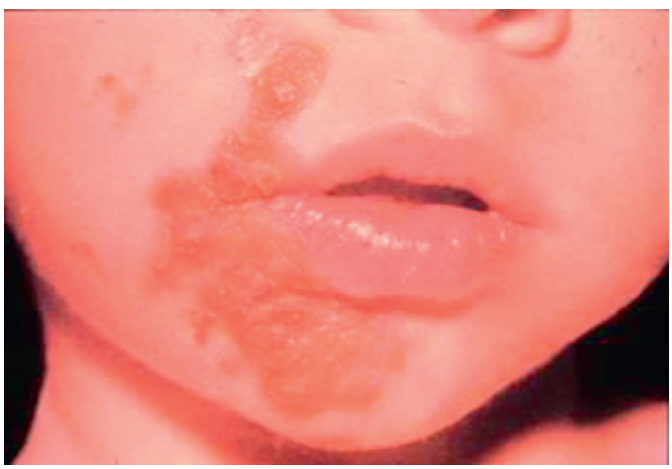

Fig. 110.1. Impetigo. (Courtesy Jonathan Singer, MD.)

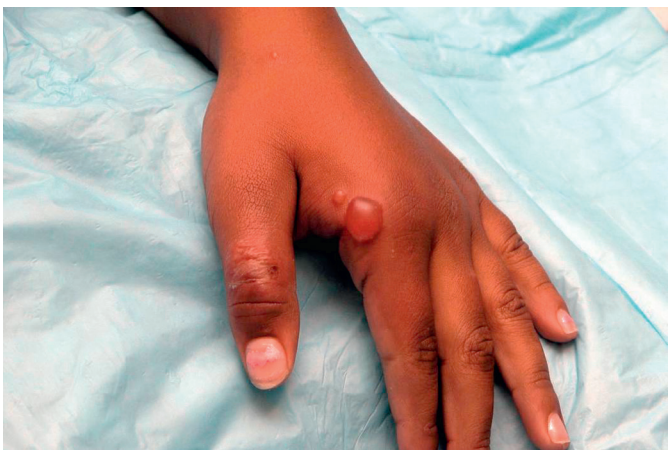

Fig. 110.2. Bullous impegito. (Courtesy David Effron, MD.)

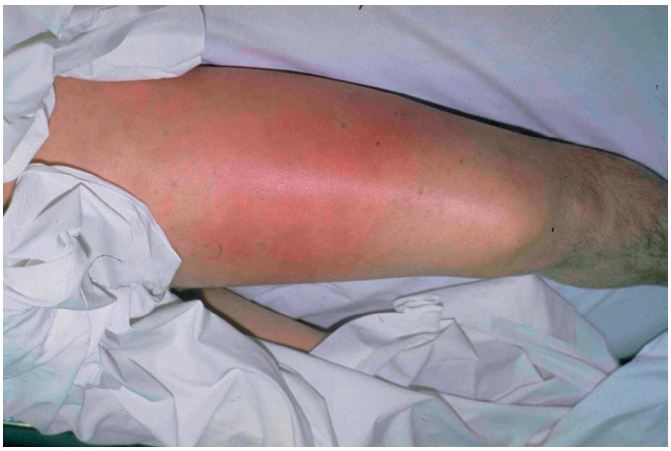

Fig. 110.3. Cellulitis. (Courtesy Jonathan Singer, MD.)

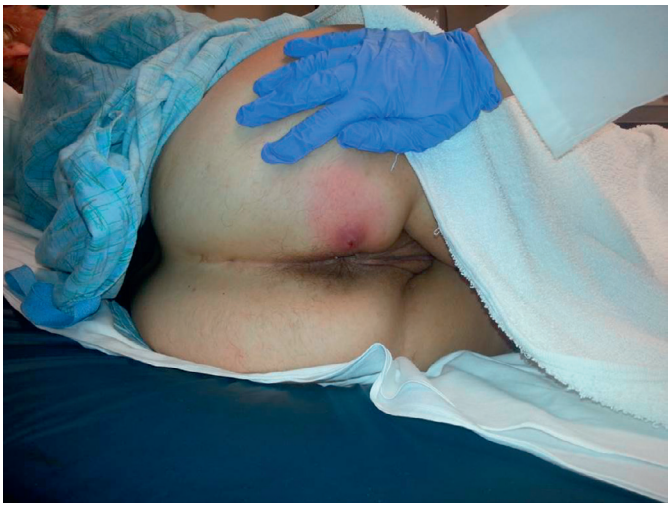

Fig. 110.4. Methicillin-resistant *Staphylococcus aureus* (MRSA) abscess with cellulitis.

of the skin and subcutaneous tissue. Systemic symptoms may include fever, myalgias, and malaise. Cellulitis may be a cause of sepsis. Ultrasound may be helpful in differentiating abscess, which appears as a fluid filled cavity, from cellulitis, which appears as cobblestoning, with fine reticular areas of hypoechoic stranding.

Mild cases of cellulitis may be treated with an oral antibiotic, such as penicillin VK, a cephalosporin, dicloxacillin, or clindamycin. Moderate cases requiring IV therapy should be treated with a penicillin, ceftriaxone, cefazolin, or clindamycin. Severe cases should be treated with IV vancomycin plus piperacillin/tazobactam. Necrotizing fasciitis and emergent surgical consultation should be considered.[6]

Soft tissue skin infections are discussed in more depth in Chapter 129.

Abscess

Abscesses may present with localized soft tissue swelling, erythema, and fluctuance (Fig. 110.4). Ultrasound may be helpful in differentiating abscess, which appears as a fluid filled cavity from cellulitis, which appears as cobblestoning, with fine reticular areas of hypoechoic stranding. Mild abscesses require incision and drainage alone. Recent literature suggests higher cure rate for antibiotic treatment with TMP-SMX in addition to incision and drainage.[7] Moderate or severe abscesses should have culture and sensitivity performed. Empirical antibiotic therapy may be added, with agents such as TMP-SMX or doxycycline. If IV antibiotics are indicated, agents may include vancomycin, daptomycin, linezolid, televancin, or ceftaroline.[6]

Hidradenitis suppurativa affects the apocrine sweat glands. Recurrent abscess formation in the axillae and groin resembles localized furunculosis. The condition tends to be recurrent and may be extremely resistant to therapy. Ultrasound will help differentiate abscesses from vascular or lymphoid structures. Hidradenitis suppurativa may be treated with drainage of abscesses if they are fluctuant, painful, and large. Antistaphylococcal antibiotics are useful if they are administered early and for a prolonged period. Begin treatment for mild disease with topical clindamycin for 3 months. In patients with more severe or nonresponsive disease, begin oral clindamycin combined with rifampin for 3 to 6 months.[8] Antiandrogen therapy may be considered if antibiotics do not produce improvement. Many cases do not respond, however, and eventually require local excision and skin grafting of the involved area.

Carbuncle

A carbuncle is a large abscess that develops in the thick, inelastic skin of the back of the neck, back, or thighs and usually involves hair follicles. Carbuncles may produce severe pain and fever. Septicemia may accompany the lesions. The diagnosis of skin abscess, furuncle, or carbuncle is usually made clinically. Ultrasonography is often helpful in diagnosis of carbuncles or abscesses that may not appear fluctuant on examination.

Local heat should be applied to furuncles and carbuncles, which should be incised and drained when fluctuant. Antibiotics are unnecessary with incision and drainage unless cellulitis or septicemia is present.

Methicillin-Resistant *Staphylococcus Aureus*

The incidence of community-associated MRSA has soared since the first report in 1993. In many major cities in the United States, MRSA is now the most common pathogen cultured from ED patients presenting with skin and soft tissue infections. Concern exists that MRSA may be more virulent than methicillin-sensitive strains, and colonization with MRSA may produce more overt infections. Hospital-acquired MRSA isolates can survive on a variety of inanimate surfaces, sometimes for weeks. It is unclear whether this is also true for community acquired MRSA isolates; if it is true, their presence on such items as clothing, towels, and athletic equipment might contribute to outbreaks. Pets (including dogs and cats), livestock, and birds have been identified as MRSA carriers; their role in MRSA transmission to humans is unclear.

MRSA infections are most often manifested as skin and soft tissue suppuration, such as an abscess, furuncle, or cellulitis. Lesions frequently exhibit central necrosis and are often confused with spider bites by patients. Clinical features cannot distinguish with certainty skin and soft tissue infections caused by MRSA from those caused by methicillin-susceptible *S. aureus*. Although rare, MRSA infection can also be manifested as necrotizing fasciitis. Recurrences of MRSA cellulitis are common. Contagion among the close household contacts of patients as well as correctional facility, school, and sports team contacts is well recognized.

Several studies have demonstrated excellent outcomes for abscesses caused by MRSA that are treated with incision and drainage alone. Antimicrobial therapy is recommended in addition to incision and drainage for patients with severe or extensive disease, rapid progression in presence of associated cellulitis, systemic illness, associated comorbidities or immunosuppression, extremes of age, abscess in an area difficult to drain, associated septic phlebitis, and lack of response to incision and drainage alone.[9]

If local resistance patterns are known, they should guide antimicrobial choice. Clindamycin combines MRSA activity with effectiveness against the majority of other gram-positive organisms. A recent study found no significant difference between the efficacy of clindamycin and TMP-SMX for the treatment of uncomplicated skin infections, including both cellulitis and abscesses.[10] Rifamycin has anti-MRSA activity, but resistance readily develops, so it should not be used as monotherapy. Linezolid is active against almost all MRSA isolates and group A streptococci. Disadvantages of its use include high cost, lack of routine availability, hematologic side effects, and potential for resistance among *S. aureus* strains. Prolonged linezolid administration increases the likelihood of resistance. Other agents effective against MRSA include TMP-SMX, minocycline, or doxycycline. Cephalosporins and macrolides are typically ineffective against MRSA. Fluoroquinolones should be avoided because *S. aureus* resistance develops readily.

Patients with large abscesses, abscesses in high-risk locations, fever, signs of systemic infection, young age, or immunodeficiency prompt consideration of hospitalization. Vancomycin is considered the parenteral drug of choice for patients with invasive *S. aureus* infection, although clinical failures have been reported. It is reasonable to combine vancomycin with another effective antistaphylococcal agent because many antibiotics have better bactericidal activity. In severely ill patients, carbapenems such as meropenem, panipenem, and ertapenem are recommended, because they are active against MRSA and synergistic with vancomycin. Other effective parenteral agents may include clindamycin, linezolid, daptomycin, tigecycline, or telavancin.[6]

Recurrent infections are generally treated like initial episodes. Although "decolonization" strategies have been recommended, neither the indications for their use nor their effectiveness in reducing the risk of recurrences is established. Decolonization strategies include the use of intranasal mupirocin to reduce nasal carriage of MRSA; however, eradication of nasal colonization appears to be transient.

Common antiseptics appear to retain reasonable activity against MRSA, although the results of studies are somewhat conflicting. Good personal hygiene, including appropriate handwashing techniques, separation of infected patients from other types of patients, and routine cleaning of shared equipment, are essential to limiting MRSA spread.

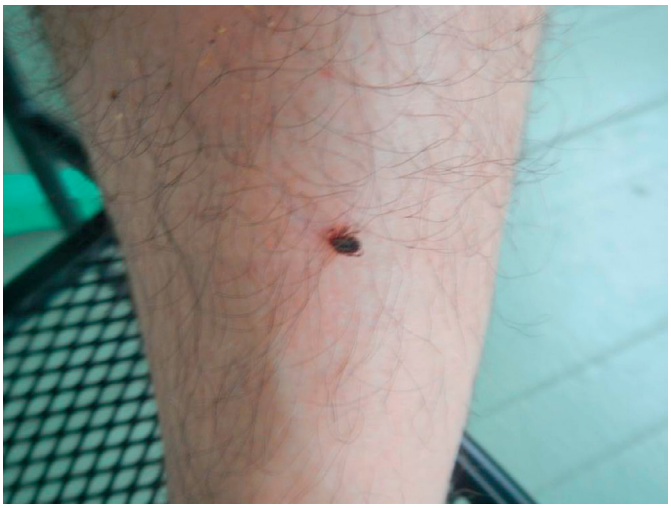

Fig. 110.5. Tick.

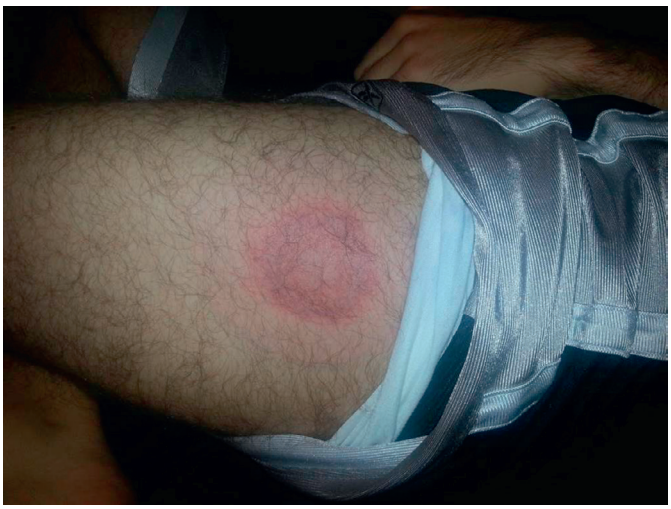

Fig. 110.6. Erythema migrans.

Erythema Migrans

Lyme disease is caused by the organism *Borrelia burgdorferi* and is transmitted by the deer tick bite (Fig. 110.5). Most cases occur in the spring and early summer. Endemic areas in the United States include the Northeast, Midwest, West, and scattered other areas. Although 36 to 48 hours of tick attachment is necessary to transmit disease, less than 33% of patients recall a tick bite. The incubation period is 3 to 30 days.

Clinical presentations include three disease stages. Stage I occurs early and is manifested by malaise, headache, fever, lymphadenopathy, and arthralgias. Stage I typically resolves in 4 weeks. Erythema migrans occurs in 60% to 80% of cases and manifests as erythematous annular, non-scaling lesion with central clearing (Fig. 110.6). Stage II presents with secondary annular lesions, fever, lymphadenopathy, neurologic manifestations, or cardiac conduction abnormalities that may last weeks to months. Stage III manifests as chronic arthritis, dermatitis, and central nervous system (CNS) disease.

Diagnostic tests may include a nonspecific elevated ESR and serologic tests, which are helpful in establishing the definitive diagnosis but are not available acutely.

Management should include appropriate antibiotic administration. The antibiotic regimen may include doxycycline for 10 to 21 days, or as alternates, cefuroxime, ceftriaxone, or penicillin G. Amoxicillin may be used in pediatric and pregnant patients.

An in depth discussion of Lyme disease can be found in Chapter 126.

Necrotizing Fasciitis

Necrotizing fasciitis should be considered with skin and soft tissue infection with signs of systemic toxicity, or severe infection (Figs. 110.7, 110.8, and 110.9). Prompt surgical consultation is recommended. Empirical antibiotic treatment should be instituted with broad coverage (eg, vancomycin or linezolid plus piperacillin-tazobactam or a carbapenem; or plus ceftriaxone and metronidazole), because the etiology can be polymicrobial (mixed aerobic/anaerobic microbes) or monomicrobial (group A streptococci, community-acquired MRSA).[9]

An in depth discussion of necrotizing fasciitis can be found in Chapter 129.

Meningococcal Infection

Meningococcal infection is caused by the organism *Neisseria meningitides,* typically transmitted by respiratory secretions.

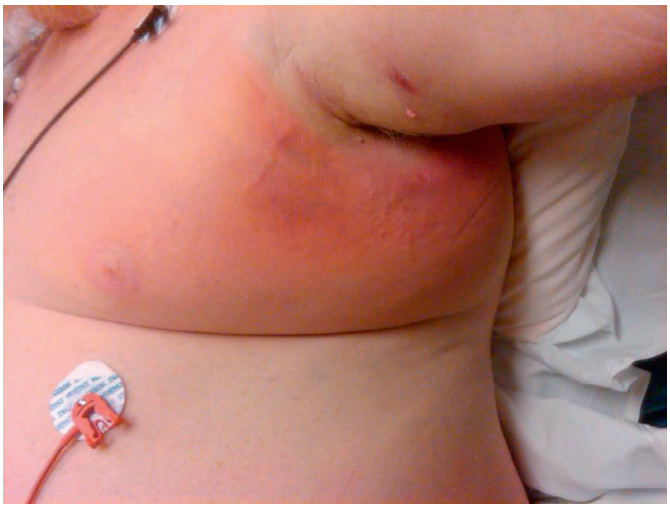

Fig. 110.7. Necrotizing fasciitis.

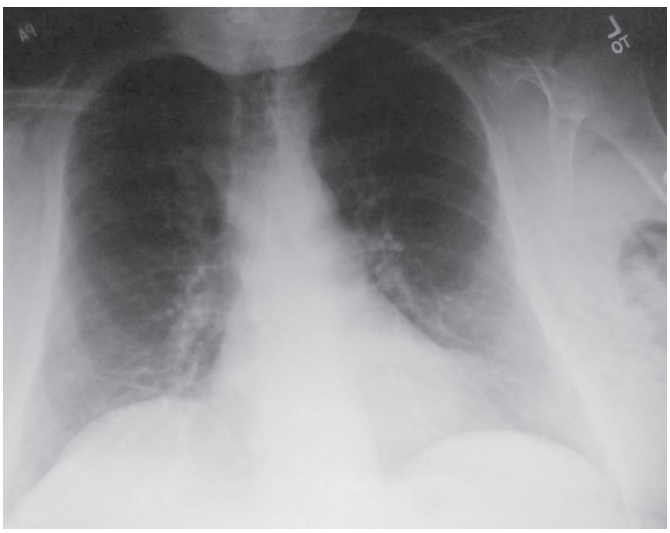

Fig. 110.8. Necrotizing fasciitis. Note air in subcutaneous tissues.

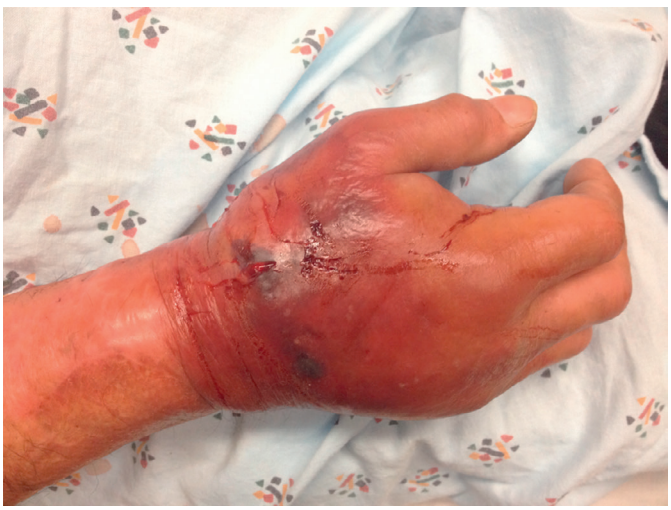

Fig. 110.9. Necrotizing fasciitis.

Meningococcal disease may manifest as one of three syndromes: meningitis, bacteremia, or bacteremic pneumonia. Meningococcal disease typically affects healthy children and adolescents, and it may result in significant morbidity and mortality. Infection is fatal in approximately 10% of cases.

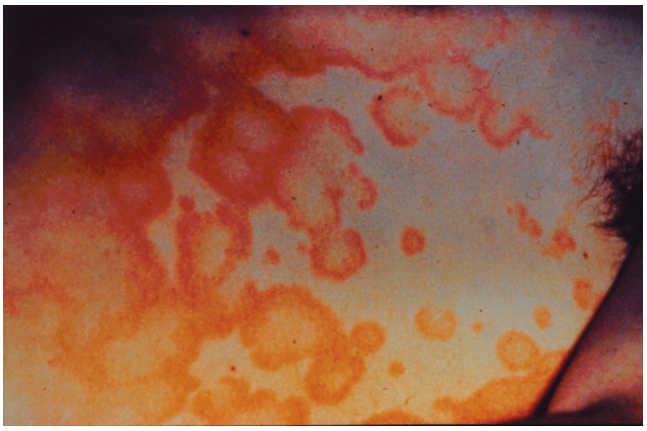

Fig. 110.10. Erythema marginatum associated with rheumatic fever. (Courtesy David Effron, MD.)

Clinical presentation may include fever, malaise, arthralgias, nausea, and vomiting. Cutaneous findings of macules, papules, vesicles, or petechiae and purpura may be present.

Ten percent of cases may present with Waterhouse-Friderichsen syndrome characterized by shock with intracutaneous hemorrhage.

An in depth discussion of meningococcal disease can be found in Chapter 121.

The diagnosis should be suspected clinically in the ED setting and treated promptly. Confirmatory tests may include blood cultures, cerebrospinal fluid (CSF) cultures, or skin scrapings.

Rapid administration of antibiotics is essential. Empirical therapy should be instituted with agents, such as a third generation cephalosporin (eg, ceftriaxone or cefotaxime) plus vancomycin. Alternative antibiotics may include penicillin G, chloramphenicol, a fluoroquinolone, or aztreonam. Dexamethasone should also be considered for suspected or proven meningitis. Immunization against meningococcal infection is recommended for groups at increased risk for infection, including adolescents and persons at risk for exposure.

Scarlet Fever

Scarlet fever results from group A strep infection. The illness has an abrupt onset with fever, chills, malaise, and sore throat, followed within 12 to 48 hours by a distinctive rash that begins on the chest and spreads rapidly, usually within 24 hours. Circumoral pallor may be noted. The skin has a rough sandpaper-like texture because of the multitude of pinhead-sized lesions. The pharynx is injected, and there may be erythematous lesions or petechiae on the palate. After the resolution of symptoms, desquamation of the involved areas occurs and is characteristic of the disease. Erythema marginatum may be seen in 10% of cases and presents with annular erythematous lesions that may be transient and reappear over days, weeks, or months (Fig. 110.10).

Complications include the development of a streptococcal infection of lymph nodes, tonsils, middle ear, and respiratory tract. Late complications include rheumatic fever and acute glomerulonephritis.

Treatment is with oral penicillin VK or IM benzathine penicillin (given as Bicillin C-R). In patients allergic to penicillin, treatment may be initiated with erythromycin, other macrolides, or a cephalosporin.

Syphilis

Syphilis is the third most common sexually transmitted infection in the United States (following chlamydia and gonorrhea) and is

Fig. 110.11. Primary syphilis. (Courtesy David Effron, MD.)

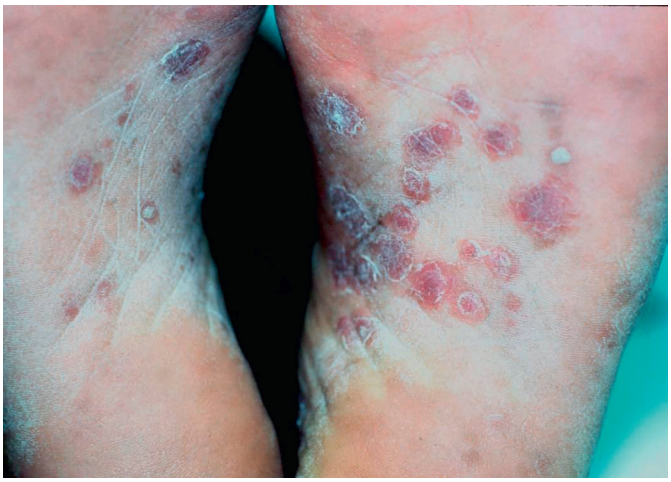

Fig. 110.12. Secondary syphilis. (Courtesy David Effron, MD.)

transmitted by direct contact with an infectious lesion. The causative organism is the spirochete *Treponema pallidum.* After an incubation period of 10 to 90 days, the primary lesion appears, which lasts 3 to 12 weeks and heals spontaneously. In 6 weeks to 6 months after exposure, the secondary stage appears, which involves a variety of mucocutaneous lesions. These lesions also heal spontaneously in 2 to 6 weeks as the disease enters the latent phase. Either a prolonged latent phase or tertiary syphilis follows. Among untreated patients, 25% display at least one relapse of mucocutaneous lesions of the oral cavity or anogenital region.

The chancre is the dermatologic manifestation of primary syphilis. Chancres usually appear as single lesions but may be multiple. They appear at the site of spirochete inoculation, usually the mucous membranes of the mouth or genitalia. The chancre begins as a papule and characteristically develops into an ulcer approximately 1 cm in diameter with a clean base and raised borders (Fig. 110.11). The chancre is painless unless it is secondarily infected, and it may be accompanied by painless lymphadenopathy. Many patients do not recall the primary chancre.

The secondary stage usually follows the primary stage by 6 weeks or more but rarely overlaps primary syphilis. There are a number of cutaneous manifestations of secondary syphilis. Lesions may be erythematous or pink macules or papules, usually with a generalized symmetric distribution. Secondary syphilis should be considered in the differential diagnosis of any maculopapular rash. Pigmented macules and papules may appear on the palms and soles (Fig. 110.12). Generalized lymphadenopathy and malaise accompany the skin lesions. Moist, flat, verrucous condyloma latum may appear in the genital area. These lesions are highly contagious.

The diagnosis of primary or secondary syphilis should be made in the ED based on clinical presentation. Definitive diagnosis is made by the identification of spirochetes with darkfield microscopy and by serologic testing. The result of the Venereal Disease Research Laboratory (VDRL) test, the most commonly used diagnostic serologic test, is positive in approximately three-fourths of patients with primary syphilis, but may be negative early in the course of the disease. The VDRL test result is invariably positive in cases of secondary syphilis, usually in titers of 1:16 or greater. The most specific and sensitive serologic test is the fluorescent treponemal antibody absorption (FTA-ABS) test. A biologic false-positive serologic test response for syphilis is defined as a positive VDRL test result with a negative FTA-ABS test result. This situation is seen acutely after vaccination or infections, especially mycoplasmal pneumonia, mononucleosis, hepatitis, measles, varicella, and malaria, and in pregnancy. Chronic biologic false-positive reactions (ie, those lasting longer than 6 months) may occur with systemic lupus erythematosus, thyroiditis, lymphoma, and narcotic addiction or in elderly patients. Most false-positive reactions are in low titer ranges of 1:1 to 1:4.

Guidelines for syphilis treatment, including in penicillin allergic individuals, are available at www.cdc.gov. Primary and secondary syphilis is treated with benzathine penicillin G in a dose of 2.4 million units IM. Human immunodeficiency virus (HIV)-infected patients require more intensive therapy. Patients with early latent syphilis are treated the same as patients with primary disease; late latent syphilis and tertiary syphilis are treated with benzathine penicillin G, three doses of 2.4 million units IM at weekly intervals for a total of 7.2 million units. Treatment of neurosyphilis requires infusion of aqueous crystalline penicillin, 3 to 4 million units IV every 4 hours for 10 to 14 days.[13] Within 12 hours of receiving therapy, patients may experience a febrile reaction and diffuse rash called the *Jarisch-Herxheimer reaction;* thus it is best to warn patients of this possibility. The reaction resolves spontaneously, usually within 24 hours.

Treatment may be administered in the ED if the diagnosis can be made on clinical, microscopic, or serologic grounds. If this cannot be done, a serologic sample should be drawn and the patient referred for treatment. The VDRL test response may be expected to return to nonreactive 6 to 12 months after the treatment of primary disease or 1 to 1½ years after the treatment of secondary disease. Patients with tertiary syphilis who are adequately treated may nevertheless retain a positive serologic result.

An in depth discussion of syphilis can be found in Chapter 88.

Gonococcal Dermatitis

The arthritis-dermatitis syndrome is the most common presentation of disseminated gonococcal disease. It occurs in less than 2% of patients with gonorrhea, affecting women primarily. Fever and migratory polyarthralgias commonly accompany the skin lesions. The lesions are often multiple and have a predilection for periarticular regions of the distal extremities. The lesions begin as erythematous or hemorrhagic papules that evolve into pustules and vesicles with an erythematous halo (Fig. 110.13). They may be tender and may have a gray necrotic or hemorrhagic center. Healing with crust formation usually occurs within 4 or 5 days,

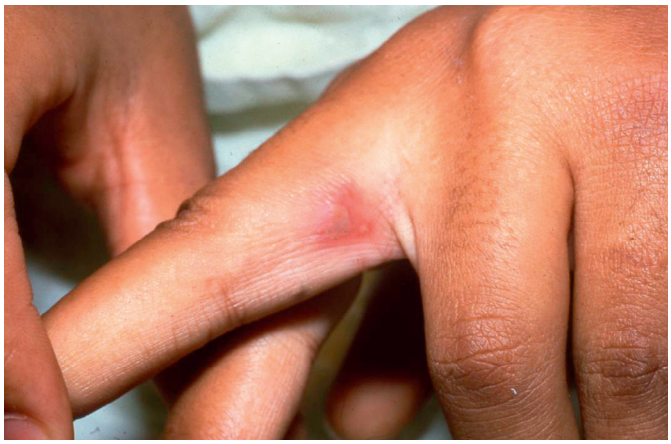

Fig. 110.13. Disseminated gonorrhoea. (Courtesy David Effron, MD.)

although recurrent crops of lesions may appear even after antibiotics have been started.

The organism may be cultured from the cutaneous lesions. Gram stain only occasionally reveals the organisms. A more reliable diagnostic technique is immunofluorescent antibody staining of direct smears from pustules. This method indicates that the lesions may be the result of hematogenous dissemination of nonviable gonococci.

Current treatment of disseminated gonococcal infection is with parenteral ceftriaxones, or ceftizoxime or cefotaxime. Patients allergic to β-lactam antibiotics or those with severe penicillin allergies may be treated with spectinomycin. Ciprofloxacin and ofloxacin are not recommended because of increasing resistance patterns. Hospitalization is recommended for patients with disseminated gonococcal infection.

An in depth discussion of gonococcal disease can be found in Chapter 88.

Staphylococcal Scalded Skin Syndrome

Staphylococcal scalded skin syndrome (SSSS) generally occurs in children 6 years old or younger. It is caused by an infection with phage group 2 exotoxin-producing staphylococci. The illness begins with erythema and crusting around the mouth. The erythema then spreads down the body, followed by bulla formation and desquamation. Mucous membranes are usually typically spared. After desquamation occurs, the lesions dry up quickly, with clinical resolution in 3 to 7 days.

Most group 2 toxin-producing organisms are penicillin resistant. Although most patients will recover without antibiotic treatment, IV therapy with nafcillin, cephalexin, or dicloxacillin is recommended.[14] Clindamycin, vancomycin, or linezolid may be considered in cases of suspected MRSA.

An in depth discussion of SSSS can be found in Chapter 129.

Toxic Shock Syndrome

Toxic shock syndrome (TSS) is an acute febrile illness characterized by a diffuse desquamating erythroderma. Clinical presentation may include high fever, hypotension, constitutional symptoms, multiorgan involvement, and rash. The syndrome gained notoriety in the early 1980s because of association with tampon use. However, it is also well known in men and children. Its appearance has often been linked to exotoxin-producing *S. aureus*. Approximately 50% of cases are associated with menstruation. Other cases occur in the postoperative setting, burns, postpartum infection, osteomyelitis, arthritis, empyema, fasciitis, septic abortion, peritonsillar abscess, sinusitis, and subcutaneous abscess.

TSS is caused by *S. aureus* or group A streptococcus, also called *Streptococcus pyogenes*. It has been reported in previously healthy patients, immunocompromised patients, and elders. Fatigue, localized pain, and nonspecific symptoms herald the onset of this disease, followed by septic shock and multisystem organ failure.

Diagnosis of TSS requires the presence of (1) temperature of at least 38.9° C; (2) hypotension, with a systolic blood pressure of 90 mm Hg or less; (3) rash; and (4) involvement of at least three organ systems. Systemic involvement may include the gastrointestinal tract, muscular system, or CNS and laboratory evidence of renal, hepatic, or hematologic dysfunction. Headache, myalgias, arthralgia, alteration of consciousness, nausea, vomiting, and diarrhea may be present.

The rash is typically a diffuse, blanching, macular erythroderma. Accompanying nonexudative mucous membrane inflammation is common. Pharyngitis, sometimes accompanied by a "strawberry tongue," conjunctivitis, or vaginitis, may be seen. As a rule, the rash fades within 3 days of its appearance. This is followed by a full-thickness desquamation, most commonly involving the hands and feet.

Initial treatment of TSS consists of IV fluid replacement, ventilatory support, pressor agents, antibiotics covering *S. aureus* (including MRSA) and *S. pyogenes*. Initial empirical antibiotic regimens may include clindamycin, vancomycin, linezolid, imipenem, meropenem, ticarcillin-clavulanate, or piperacillin-tazobactam.

An in depth discussion of TSS can be found in Chapter 129.

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is caused by *Rickettsia rickettsii,* an organism harbored by a variety of ticks. The organism is transmitted to humans through tick saliva at the time of a tick bite or when the tick is crushed while in contact with the host. Many patients do not report tick exposure. Although originally described in the Rocky Mountain region, this disease occurs in other areas of North, South, and Central America. Most reported cases are from the southeastern United States.

The onset of the illness is usually abrupt, with headache, nausea and vomiting, myalgias, chills, and fever. On occasion, the onset is more gradual, with progressive anorexia, malaise, and fever. The disease may last 3 weeks and may be severe with prominent involvement of the CNS, cardiac, pulmonary, gastrointestinal and renal systems, disseminated intravascular coagulation, or shock.

The rash develops on the second to sixth day. It begins with erythematous macules that blanch on pressure, appearing first on the wrists and ankles. These macules spread up the extremities and to the trunk and face. They may become petechial or hemorrhagic (Fig. 110.14). Lesions on the palms and soles are particularly characteristic. Increased capillary fragility and splenomegaly may be present.

The diagnosis of Rocky Mountain spotted fever should be made based on clinical presentation in the ED. Definitive testing is not available in the ED, and may include the Weil-Felix reaction and more specific immunofluorescent procedures. Treatment should be initiated as soon as the disease is suspected on clinical grounds.

Doxycycline is the antibiotic of choice. Failure to administer antibiotics in a timely fashion in this illness dramatically increases morbidity and mortality. Chloramphenicol may be used for patients allergic to tetracyclines and in children younger than 9 years old. Sulfa drugs should be avoided because they may exacerbate the illness. Rickettsiae are routinely resistant to penicillins, cephalosporins, aminoglycosides, and erythromycin. Ehrlichiosis may be difficult to differentiate from Rocky Mountain spotted

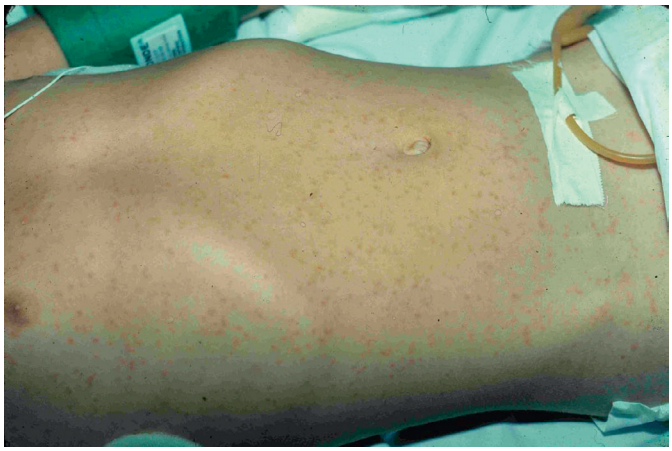

Fig. 110.14. Rocky Mountain spotted fever. (Courtesy Jonathan Singer, MD.)

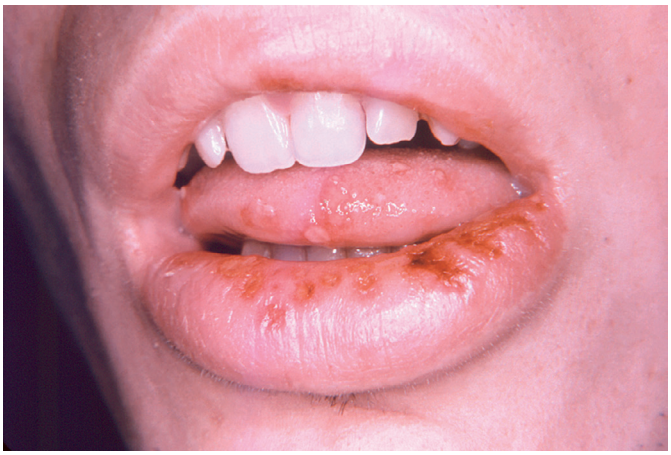

Fig. 110.16. Herpes simplex. (Courtesy Centers for Disease Control and Prevention [CDC] Public Health Image Library, Robert E. Sumpter.)

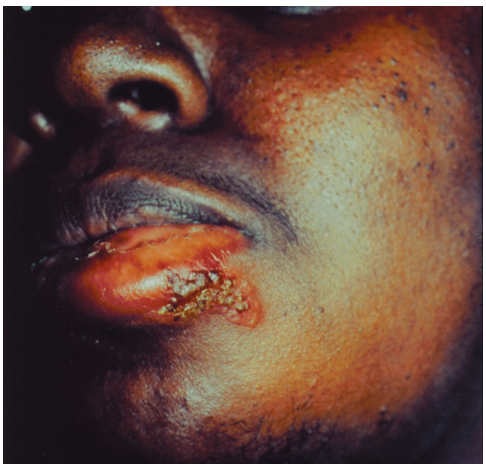

Fig. 110.15. Herpes simplex virus 1 (HSV-1) infection. (Courtesy David Effron, MD.)

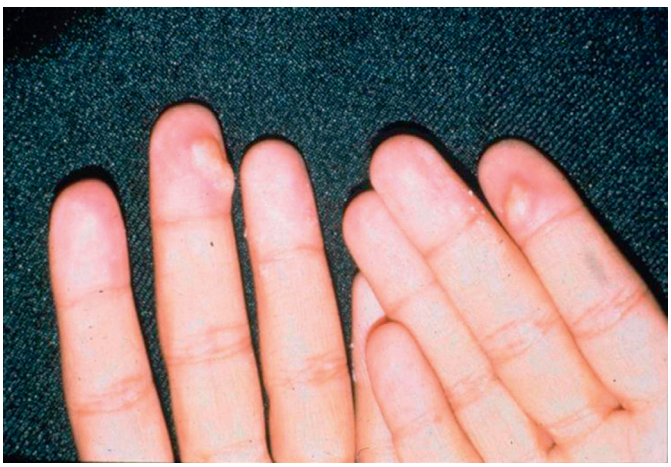

Fig. 110.17. Herpetic whitlow. (Courtesy Jonathan Singer, MD.)

fever clinically and is also reliably treated with doxycycline. Chloramphenicol efficacy in this disease is not established.

An in depth discussion of Rocky Mountain spotted fever can be found in Chapter 126.

Viral Infections

Herpes Simplex Virus

Two known variants of HSV cause human infection: HSV-1 and HSV-2. HSV-1 primarily affects nongenital sites, whereas lesions caused by HSV-2 are found predominantly in the genital area and are typically transmitted primarily by sexual contact.

The characteristic presentation of skin infection with HSV is painful, grouped vesicles on an erythematous base (Fig. 110.15). The lesions are usually localized in a nondermatomal distribution. The skin distribution may become more generalized in patients with atopic dermatitis and other dermatoses. Adults with HSV infection should avoid contact with children with atopic dermatitis, especially in the first 3 to 5 days of infection.

The mouth is the most common site of HSV-1 infections. Children are affected more commonly than adults. Small clusters of vesicles appear but are soon denuded, leaving irregularly shaped, crusted erosions. The severity of gingivostomatitis varies from the presence of small ulcers to extensive ulceration of the mouth, tongue, and gums accompanied by fever and cervical lymphadenopathy (Fig. 110.16). The infection may be so severe that oral fluid intake is difficult, and dehydration may result. Healing typically occurs in 7 to 14 days unless a secondary bacterial infection occurs.

Herpetic whitlow is a herpes infection of the hand, typically affecting the distal phalanx (Fig. 110.17). It may be caused by HSV-1 (60%) and HSV-2 (40%).

HSV-2 infections in men present with either single or multiple vesicles on the penile shaft or glans penis. Fever, malaise, and regional adenopathy may be present. A prodrome of local pain and hyperesthesia may precede the appearance of the cutaneous lesions. The vesicles erode after several days, become crusted, and heal in 10 to 14 days. Infections in women involve the introitus, cervix, or vagina. Vesicles may be grouped or confluent. Herpetic cervicitis or vaginitis may be the cause of severe pelvic pain, dysuria, or vaginal discharge. Recurrence is common, but recurrent episodes tend to be less severe. A correlation based on serologic and epidemiologic data has been discovered between HSV-2 reproductive tract infections and carcinoma of the cervix.

Recommended treatment for a first clinical episode of genital herpes is with acyclovir, famciclovir, or valacyclovir. These agents reduce the duration of viral shedding, accelerate healing, and shorten the duration of symptoms, but they do not prevent recurrent episodes. Prophylactic administration of acyclovir may be effective in ameliorating the severity of recurrent genital herpes, but the effects of long-term administration are unknown.

IV therapy should be considered for immunocompromised patients. A mucocutaneous herpes infection in such patients is potentially fatal, because it has a propensity for generalization and dissemination to the internal organs.

Any vesicular eruption on skin or mucous membranes in a neonate should prompt concern for HSV infection, because there is a high likelihood of dissemination in this group. Unless an alternative diagnosis is established, urgent testing of the vesicle fluid for HSV along with acyclovir therapy is indicated.

Supportive care and pain control are important components of treatment. Systemic analgesics and topical anesthetic agents may be useful. Education of the patient about the prevention or spread of the disease during sexual contact and the birth process is imperative.

An in depth discussion of HSV infection can be found in Chapter 122.

Varicella-Zoster Virus

Varicella. Varicella, or chickenpox, is an infection caused by the varicella-zoster virus. After an incubation period of 14 to 21 days, the illness begins with a low-grade fever, headache, and malaise. The exanthem coincides with these symptoms in children and follows them by 1 or 2 days in adults.

The skin lesions rapidly progress from macules to papules to vesicles to crusting, sometimes within 6 to 8 hours. The vesicle of varicella is 2 or 3 mm in diameter and surrounded by an erythematous border (Fig. 110.18). An unusual form of varicella has larger bullae. The drying of the vesicle begins centrally, producing umbilication. The dried scabs fall off in 5 to 20 days.

Lesions appear in crops on the trunk, where they are seen in the highest concentration, and on the scalp, face, and extremities. The hallmark of varicella is the appearance of lesions in all stages of development in one region of the body. Extensive eruptions are often associated with a high and prolonged fever.

Complications include encephalitis or meningitis, pneumonia, staphylococcal or streptococcal cellulitis, thrombocytopenia, arthritis, hepatitis, and glomerulonephritis. Varicella pneumonia occurs more commonly in adults than in children.

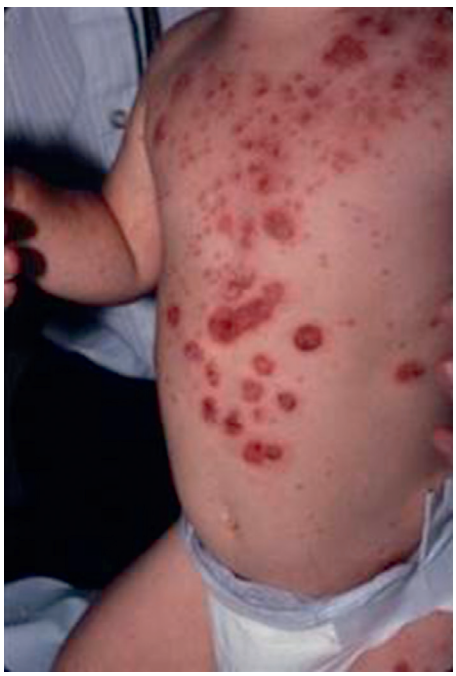

Fig. 110.18. Varicella zoster. (Courtesy Jonathan Singer, MD.)

The illness is self-limited, and treatment is symptomatic. Salicylates should be avoided to minimize the risk of subsequent Reye syndrome. Oral acyclovir may be effective if it can be started within 24 hours of development of rash for patients with chronic respiratory or skin disease. Some studies report a diminution in duration and magnitude of fever and number and duration of lesions with the early use of acyclovir.

Isolation of infected patients is often futile because the disease may be transmitted before the diagnosis is clinically evident. Because the disease has the potential to be contagious until all vesicles are crusted and dried, infected persons should be kept at home until this stage is reached.

Varicella zoster immune globulin (VariZIG) is indicated for administration to high-risk individuals within 10 days (ideally within 4 days) of chickenpox (varicella zoster virus) exposure.[15]

The varicella vaccine is a live attenuated virus; it is highly efficacious and very safe. A single dose is effective in children between the ages of 1 and 13 years. For older children, two doses separated by 4 to 8 weeks are recommended. In addition, the incidence of zoster occurring after vaccination appears to be lower than that of naturally acquired disease.

An in depth discussion of varicella infection can be found in Chapter 122.

Herpes Zoster. Herpes zoster, or "shingles," is an infection caused by the varicella-zoster virus. It occurs exclusively in individuals who have previously had chickenpox. Dermatomal pain may precede the eruption by 1 to 10 days and is variable in intensity; it may be described as sharp, dull, or burning in quality. The rash consists of grouped vesicles on an erythematous base involving one or several dermatomes. The thorax is involved in most cases, and the trigeminal distribution is the next most commonly involved region.

The vesicles initially appear clear and then become cloudy and progress to scab and crust formation. This process takes 10 to 12 days, and the crusts fall off in 2 or 3 weeks (Fig. 110.19). Herpes zoster has a peak incidence in patients 50 to 70 years old and is unusual in children. Although the association with leukemia, Hodgkin's lymphoma, and other malignant neoplasms is well known, rarely does the appearance antedate the diagnosis of such diseases. Most cases of herpes zoster occur in healthy individuals.

Herpes zoster may be transmitted from patients with chickenpox to susceptible individuals. Chickenpox may also be acquired by contact with shingles, although this is less common. It is generally believed, however, that herpes zoster is caused by a

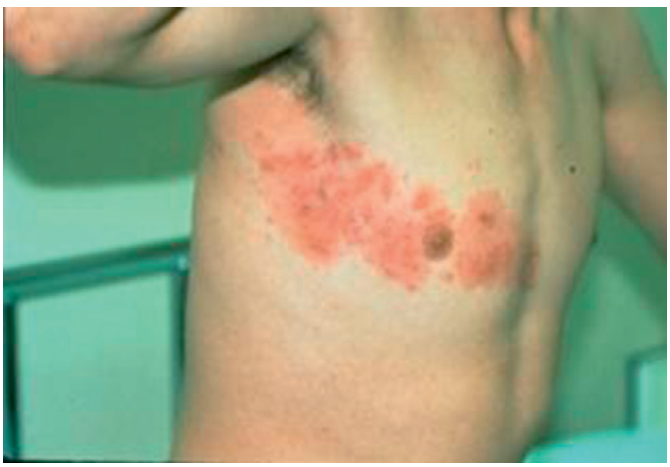

Fig. 110.19. Herpes zoster. (Courtesy David Effron, MD.)

reactivation of latent varicella-zoster virus present since the initial infection. During the latent period between the two illnesses, the virus is thought to reside in dorsal root ganglion cells.

Herpes zoster has a very low mortality rate and is rarely life-threatening, except when dissemination to the visceral organs occurs. Complications include CNS involvement, ocular infection, and neuralgia. Meningoencephalitis, myelitis, and peripheral neuropathy have been reported.

Ocular complications occur in 20% to 70% of cases involving the ophthalmic division of the trigeminal nerve. The severity varies from mild conjunctivitis to panophthalmitis, which threatens the eye. Corneal dendritic lesions may be visible on fluorescein examination. Eye involvement may produce anterior uveitis, secondary glaucoma, and corneal scarring. There is a close correlation between eye involvement and vesicles located at the tip of the nose (Hutchinson's sign).

Herpes zoster generally tends to be more severe in immunosuppressed patients, especially those with acquired immunodeficiency syndrome (AIDS), Hodgkin's disease, or other lymphomas. Cutaneous dissemination occurs more commonly in these patients than in the general population. Visceral and CNS dissemination is also more likely to occur in these patients; therefore, they should be considered for hospitalization.

Antiviral medications are indicated, especially within 48 hours of onset of rash, to decrease the duration of symptoms and associated pain. Antiviral therapy may be initiated with acyclovir, famciclovir, or valacyclovir.[16] Supportive care is important for pain and pruritus control. Burow's solution compresses diluted 1:20 to 1:40 in water may be applied to hasten drying. The administration of corticosteroids is controversial. Steroids may reduce pain and improve sleep and ability to function. Steroids have not been shown to reduce the incidence of postherpetic neuralgia.

IV administration of acyclovir may be of some benefit in the treatment of severe ocular herpes zoster. Treatment includes mydriasis and the application of topical corticosteroids. Unlike the situation with herpes simplex conjunctivitis, eye involvement caused by herpes zoster does not appear to be exacerbated by corticosteroids.

Postherpetic neuralgia may occur in 15% of patients and is more commonly in the elderly. Treatments may include opioids, amitriptyline, topical capsaicin, topical lidocaine, topical or oral gabapentin.[17,18]

Immunization against herpes zoster is recommended in older adults. The varicella vaccine has been shown to boost immunity against herpes zoster virus (shingles) and is recommended for patients 60 years and older.[19] It reduces the occurrence of shingles and also slightly reduces pain compared with no vaccination in those who ultimately develop shingles.

An in depth discussion of herpes zoster infection can be found in Chapter 122.

Viral Exanthems

An exanthem is defined as a skin eruption that occurs as a symptom of a general disease. In the pediatric population, 72% of cases of fever and rash are caused by viruses, and 20% are caused by bacteria. Approximately 30 enteroviruses, predominantly the coxsackievirus and echovirus groups, and four types of adenoviruses are known to produce exanthems (Fig. 110.20). The exanthems of the coxsackievirus and echovirus are most thoroughly documented. Most viral exanthems are maculopapular, although scarlatiniform, erythematous, vesicular, and petechial rashes are occasionally seen. The eruptions are variable in their extent, are nonpruritic, and do not desquamate. Oropharyngeal lesions may be present.

The classic viral exanthems are rubeola (measles), rubella (German measles), herpesvirus 6 (roseola), parvovirus B19 (erythema infectiosum or fifth disease), and the enteroviruses (echovirus and coxsackievirus). Widespread immunization programs have reduced the incidence of rubeola and rubella.

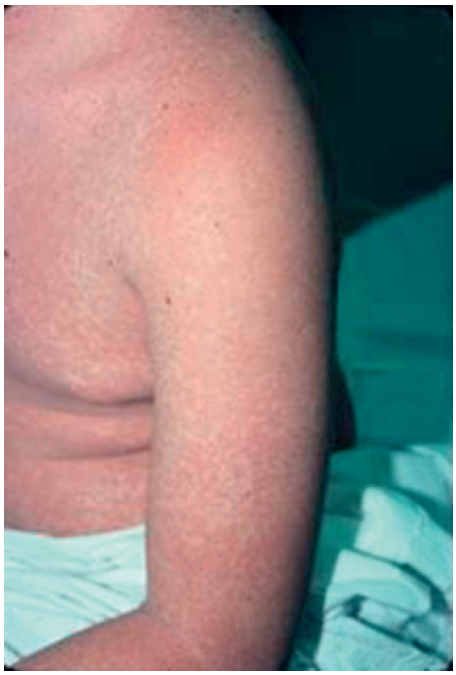

Fig. 110.20. Enterovirus. (Courtesy Jonathan Singer, MD.)

An in depth discussion of viral infections can be found in Chapter 122.

Roseola Infantum. Roseola infantum, otherwise known as *exanthem subitum* or *sixth disease,* is a benign illness caused by human herpesvirus 6 and human herpesvirus 7 and is typically spread by saliva. It is characterized by fever and a skin eruption. Ninety-five percent of cases are seen in children 6 months to 3 years old. A febrile seizure may occur. The fever typically has an abrupt onset, with temperature rising rapidly to 39° to 41° C, and is present consistently or intermittently for 3 or 4 days, at which time the temperature drops precipitously to normal. The rash typically appears with defervescence. The lesions are discrete pink or rose-colored macules or maculopapules 2 or 3 mm in diameter that blanch on pressure and rarely coalesce (Fig. 110.21). The trunk is involved initially, with the eruption typically spreading to the neck and extremities. The eruptions are occasionally limited to the trunk. The rash clears during 1 or 2 days without desquamation.

Despite the presence of a high fever, the infant usually appears well. Encephalitis is a very rare complication. The prognosis is excellent, and no treatment is necessary.

Measles. Measles, or rubeola, is a highly contagious viral illness spread by contact with infectious droplets, with an incubation period of 10 to 14 days. In recent years, typically less than 100 cases are seen annually in the United States, compared to the 4 to 5 million cases per year prior to immunization. An outbreak in 2014 was seen in the United States, with over 500 cases. Measles is most likely to infect unvaccinated individuals, often including preschoolers in low-income homes or in heavily populated areas. Patients are considered to be contagious from 5 days prior to onset of symptoms until 5 to 6 days after the onset of dermatologic involvement.

Symptoms begin with fever and malaise. The fever usually increases daily in a stepwise manner until the fifth or sixth day of

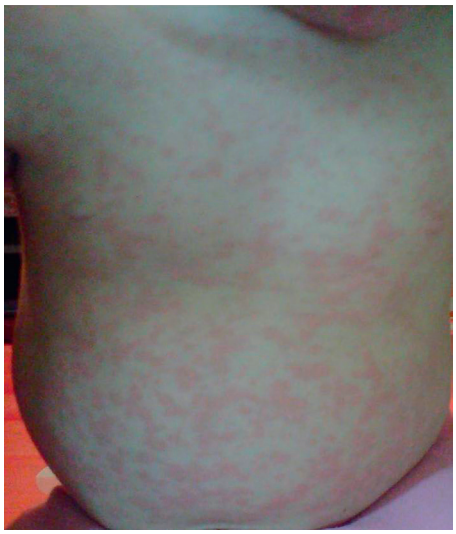

Fig. 110.21. Roseola.

the illness. Cough, coryza, and conjunctivitis are associated symptoms. On the second day of the illness, Koplik spots, which are pathognomonic of the disease, appear on the buccal mucosa as small, irregular, bright red spots with bluish white centers. Beginning opposite the molars, Koplik spots may spread to involve a variable extent of the oropharynx.

The cutaneous eruption of measles typically begins on the third to fifth day of the illness. Maculopapular erythematous lesions involve the forehead and upper neck and spread to involve the face, trunk, arms, and finally the legs and feet. Koplik spots begin to disappear coincident with the appearance of the rash. By the third day of its presence, the rash begins to fade, doing so in the order of its appearance, and the fever subsides.

Complications may include otitis media, encephalitis, and pneumonitis. Otitis media is the most common complication. Encephalitis occurs in approximately 1 in 1000 cases of measles and carries 15% mortality. Measles pneumonia may also be life-threatening.

Treatment is primarily supportive and should include antipyretics, hydration, and treatment of pruritus. Vitamin A supplements have been associated with reductions of approximately 50% in morbidity and mortality and appear to help prevent eye damage and blindness. If bacterial invasion occurs with otitis or pneumonia, the use of antibiotics is indicated. Isolation of infected children is of limited value because exposure usually occurs before the appearance of the rash. Measles is not contagious after the fifth day of the presence of the rash. Infection confers lifelong immunity.

Postexposure prophylaxis may be administered with the measles virus vaccine or human immunoglobulin.[20]

Rubella. Rubella, or German measles, is a viral illness characterized by fever, skin eruption, and generalized lymphadenopathy. It is spread by droplet contact, and peak incidence is in the winter and early spring. The incubation period is typically 14 to 21 days, and the rash heralds the onset of the illness in children. The maximum time of communicability is in the few days before and 5 to 7 days after the onset of the rash. Infants with congenital rubella may shed virus for more than 1 year. In adults, a 1- to 6-day prodrome of headache, malaise, sore throat, coryza, and low-grade fever precedes the rash. These symptoms generally disappear within 24 hours after the appearance of the skin eruption.

The rash of pink to red maculopapules appears first on the face and spreads rapidly to the neck, trunk, and extremities. Those on the trunk may coalesce, but lesions on the extremities do not. The rash remains for 1 to 5 days, classically disappearing at the end of 3 days. Although clearing may be accompanied by fine desquamation, this sign is usually absent.

The major complications of rubella include encephalitis, arthritis, and thrombocytopenia. The most severe complication is fetal damage. A total of 24% of infected fetuses have a congenital defect. A maternal infection may be determined by obtaining serum for hemagglutination inhibition antibody determinations, acutely and in 7 to 21 days after the first sample onset. A fourfold rise in the titer is diagnostic of rubella infection.

No treatment is required in most cases of rubella. Antipyretics are usually adequate for the treatment of headache, arthralgias, and painful lymphadenopathy.

Erythema Infectiosum. Erythema infectiosum, or "fifth disease," is caused by parvovirus B19 infection and typically affects pediatric patients. It is characterized by mild systemic symptoms, fever in 10% to 15% of patients, and a characteristic rash. Arthralgia and arthritis occur commonly in adults but rarely in children. The rash is intensely red on the face and gives a "slapped-cheek" appearance with circumoral pallor. A reticular maculopapular eruption, which may be noted on the arms, moves caudally to the trunk, buttocks, and thighs. The rash may recur with changes in temperature and exposure to sunlight. The incubation period is usually between 4 and 14 days. The infection is benign and requires supportive care only.

Fungal Infections

Fungal infections may affect the skin, scalp, or mucous membranes. The dermatophytoses are superficial fungal infections that are limited to the skin. Dermatophytes generally grow best in warm, moist environments, and grow only in the keratin or outer layer of the skin, nails, and hair. Any potential dermatophyte infection can be examined under the microscope in a KOH preparation. The specimen is examined for the characteristic branching hyphae of the dermatophytes or the short, thick hyphae and clustered spores of tinea versicolor.

Tinea Corporis

Tinea refers to superficial dermatophytic infection of the skin, hair, and/or nails, usually by the *Trichophyton* organism. Tinea corporis, commonly referred to as "ringworm" infection, presents as a sharply marginated, annular lesion with raised or vesicular margins and central clearing (Fig. 110.22). Lesions may be single or multiple. Other related forms of tinea may be seen, including tinea cruris, which involves the groin, tinea manuum, affecting the hands, and tinea pedis, infection of the feet.

The differential diagnosis of tinea corporis includes erythema migrans, granuloma annulare, psoriasis, cellulitis, and erythrasma.

Infections of the body, groin, and extremities usually respond to topical antifungal agents. A number of effective topical antifungal agents are available, including clotrimazole, haloprogin, miconazole, tolnaftate, terbinafine, naftifine, and others. Two or three daily applications of the cream form of any of these preparations result in healing of most superficial lesions in 1 to 3 weeks.[21]

Tinea Capitis

Tinea capitis is a fungal infection of the scalp. The most common organisms include *Microsporum* and *Trichophyton* species. Although it is often seen in pediatric patients 6 to 10 years old, tinea capitis may also occur in adults. It is more common among

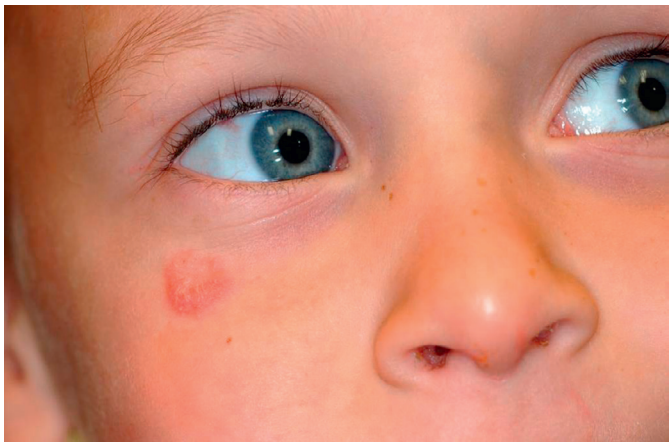

Fig. 110.22. Tinea corporis. (Courtesy David Effron, MD.)

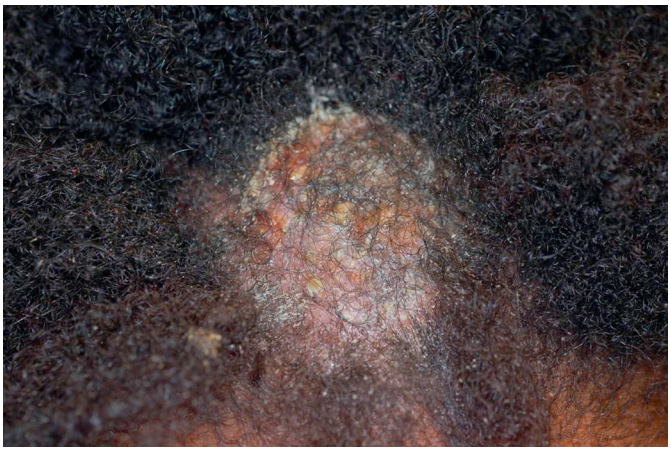

Fig. 110.23. Tinea capitis. (Courtesy David Effron, MD.)

African Americans, for uncertain reasons. Nosocomial transmission of dermatophyte infections, such as *Trichophyton tonsurans,* has also been reported. Alopecia may be seen, typically with thickened, scaly scalp. Broken hairs resembling black dots near the scalp may be seen. Hair loss is the result of hyphae growing within the hair shaft, rendering it fragile, so that the hair strands break off 1 to 2 mm above the scalp. The disease may be transmitted by close child-to-child contact and contact with household pets, hats, combs, barber's shears, and similar items. Complications may include kerion formation, lymphadenitis, bacterial pyoderma, pigmenting pityriasis alba, id reaction after treatment, secondary bacterial infection, and scarring alopecia.

The differential diagnosis of tinea capitis includes alopecia areata, atopic dermatitis, nummular eczema, bacterial infection, psoriasis, seborrheic dermatitis, "tinea" amiantacea, trichotillomania (hair pulling), and Langerhans cell histiocytosis.

A KOH preparation is not helpful in the presence of a kerion or in the absence of alopecia. The diagnosis is typically made based on clinical presentation. If in question, a fungal culture specimen may be obtained.

Systemic therapy is required for tinea capitis, due to fungal invasion of the hair follicles. Treatment should be with a systemic antifungal agent, such as terbinafine or griseofulvin. Therapy should be given for 4 to 6 weeks. The patient should be referred for outpatient follow-up with primary care within 4 weeks. Alternative therapy includes fluconazole or itraconazole for 4 to 6 weeks. Family members should be evaluated for possible infection.

Kerion

A kerion is a fungal infection affecting hair follicles that is characterized by intense inflammation, and a boggy, erythematous mass, typically affecting the scalp (Fig. 110.23). The lesion may contain frank pus. The inflammation is generally uniform and does not display satellite lesions. It usually affects the scalp and is more common in children and in African Americans. Local alopecia and scarring can ensue. Lymphadenopathy may be present. Accurate differentiation of a kerion with and without superinfection can be challenging. Wood's lamp examination and a scalp scraping and KOH preparation can help differentiate kerion from secondary bacterial infection.

Kerions are treated the same as tinea capitis, with systemic antifungal agents for 6 to 8 weeks. If bacterial superinfection exists, an antibiotic is added. Antibiotic options include oral cephalexin, dicloxacillin, or clindamycin. Clindamycin is recommended when community-acquired MRSA is a concern. Surgical drainage of kerions is not helpful and should be avoided.

Tinea Pedis

Tinea pedis, commonly referred to as *athlete's foot,* presents with scaling, maceration, vesiculation, and fissuring between the toes and on the plantar surface of the foot. Common etiologies include *Trichophyton rubrum, Trichophyton interdigitale,* and *Epidermophyton floccosum.* Secondary bacterial infection may occur. The vesicular pustular form of tinea pedis should be considered when vesicles and pustules on the instep are noted. Interdigital lesions may cause minimal symptoms and serve as a portal of entry for bacterial cellulitis. The differential diagnosis includes contact dermatitis and dyshidrotic eczema. A KOH preparation is helpful to differentiate between these processes. Treatment options include topical antifungal agents, such as terbinafine twice daily for 2 to 4 weeks; miconazole cream, powder, or spray twice daily for 2 to 4 weeks; and clotrimazole cream, solution, or lotion twice daily for 2 to 4 weeks. For severe disease or if topical treatment has failed, systemic therapy may be instituted with terbinafine for 2 weeks, fluconazole weekly for 2 to 4 weeks, or griseofulvin daily for 2 weeks.

Tinea Versicolor

Tinea versicolor, or pityriasis versicolor, is a superficial fungal infection caused by genus *Malassezia*. Superficial hypopigmented or hyperpigmented patches occur mainly on the chest and trunk but may extend to the head and limbs. As the name implies, lesions can be a variety of colors, including pink, tan, and white. The disease may be associated with pruritus. On physical examination, a fine subtle scale is noted that may appear hypopigmented (Fig. 110.24). Pale yellow or orange fluorescence under Wood's light may be seen. The differential diagnosis includes vitiligo and seborrheic dermatitis. A KOH preparation reveals short hyphae mixed with spores ("chopped spaghetti and meatballs").

Tinea versicolor may be treated with topical antifungal agents, such as 2.5% selenium sulfide shampoo, imidazole creams, and ketoconazole cream or foam. Systemic therapy may be indicated, such as oral ketoconazole. Recurrence is common. Pigmentation may not return to normal for months.

Tinea Unguium (Onychomycosis)

Tinea unguium may be caused by dermatophytes, candida, or other fungal species. Paronychia or untreated tinea pedis may be predisposing factors. Onychomycosis presents with toenails or fingernails that are thickened, opaque, cracked, or destroyed. Subungual debris is present, and the nail may contain yellowish longitudinal streaks (Fig. 110.25). The nail of the great toe is most

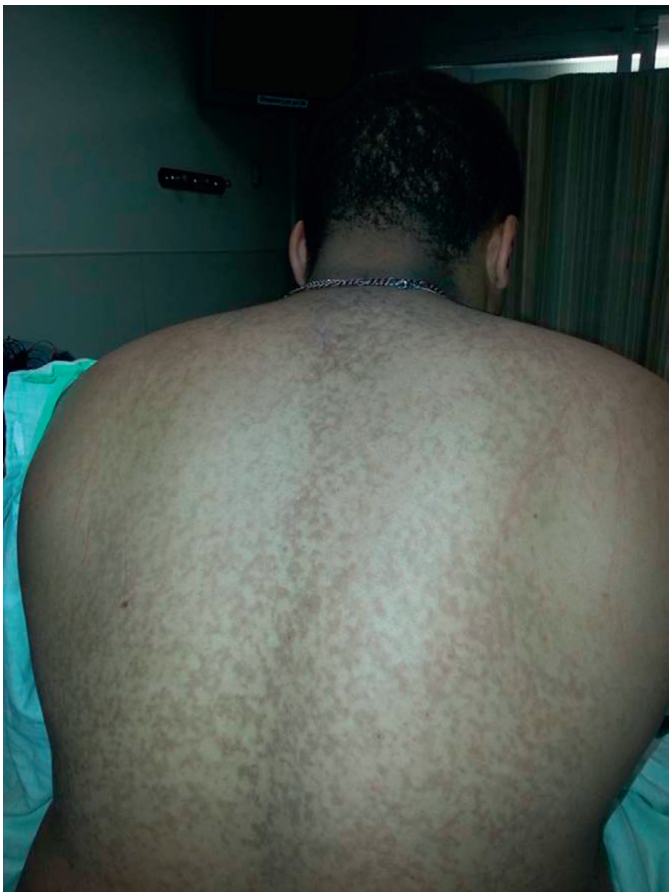

Fig. 110.24. Tinea versicolor.

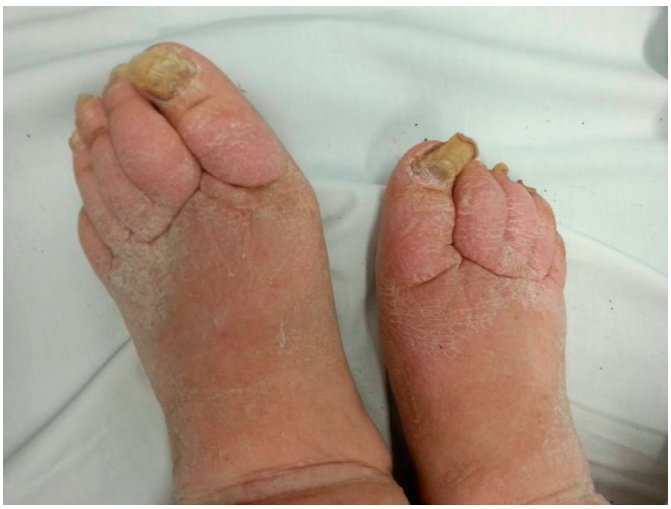

Fig. 110.25. Onychomycosis.

commonly involved. Differential diagnosis includes tinea pedis, psoriasis, or warts.

Topical therapy of the nails alone rarely results in a cure because penetration into the nail keratin is poor. Fingernails typically respond more rapidly to therapy than toenails do. Involvement of one or two nails may be treated with topical antifungal agents. More extensive infection requires systemic therapy with an antifungal agent, such as terbinafine or itraconazole.[22] Third line agents may include griseofulvin or ketoconazole, which require prolonged courses, with high relapse rates and numerous side effects. Treatment failures or relapses are common, and they may be attributed to poor patient compliance, low bioavailability, lack of drug penetration into the nail, drug resistance, and drug interactions. Additional therapies may include surgical removal of the nail, photodynamic therapy, or laser therapy.

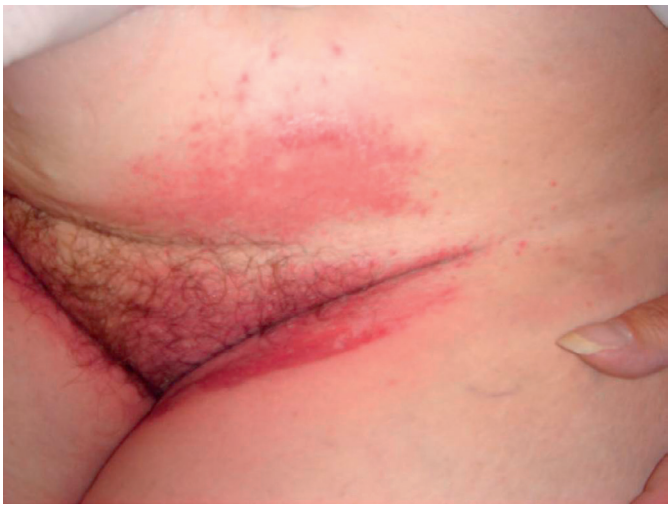

Fig. 110.26. Candida intertrigo.

Candidiasis

Infection by *Candida albicans* may occur in patients of all ages. Many conditions predispose to infection, including diabetes mellitus, HIV infection, pregnancy, obesity, smoking, malnutrition, malignancy, or treatment with corticosteroids, antibiotics, or immunosuppressive agents.

Oral Candidiasis. Oral candidiasis ("thrush") is the most common clinical expressions of *Candida* infection. It is common in newborns, elder persons, immunosuppressed individuals, or persons wearing dentures. Oral candidiasis is common in newborns, with one-third being affected by the first week of life. It appears as patches of white or gray friable material covering an erythematous base on the buccal mucosa, gingiva, tongue, palate, or tonsils. Fissures or crust at the corners of the mouth may be present. The differential diagnosis of oral candidiasis includes lichen planus (which unlike *C. albicans* is not easily scraped off), or hairy leukoplakia. Oral mucous membrane infection with *C. albicans* is an AIDS-defining illness. If the patient does not use dentures and has not taken antibiotics recently, underlying immunosuppression should be considered.

Treatment of oral candidiasis may be undertaken with topical antifungal agents, such as clotrimazole troches five times daily, or oral nystatin suspension four times daily, or nystatin pastilles four times daily. Treatment is continued for 5 to 7 days after the lesions disappear. For esophageal candidiasis, systemic antifungal therapy is always required. Oral fluconazole, IV fluconazole, or amphotericin B are options.

Cutaneous Candidiasis. Cutaneous candidiasis favors the moisture and maceration of the intertriginous areas—the interdigital web spaces, groin, axilla, and intergluteal and inframammary folds. Lesions appear as moist, bright red macules rimmed with a collarette of scale, with small satellite papules or pustules are just peripheral to the main body of the rash (Fig. 110.26). These satellite lesions are typical indicators of a *Candida* infection. Intertriginous lesions are prone to bacterial superinfection.

The differential diagnosis of cutaneous candidiasis includes contact dermatitis, tinea cruris, intertrigo, herpes simplex such as

herpetic whitlow, and folliculitis. Candidiasis, however, is less sharply demarcated than tinea cruris and brighter red than intertrigo. A KOH preparation of a specimen taken from a pustule and roof of the lesion will reveal hyphae and pseudohyphae.

Treatment of intertriginous lesions requires the removal of excessive moisture and maceration. Lesions should be exposed to circulating air from a fan several times a day. Inflammatory lesions are either soaked in or covered with compresses of cool water or Burow's solution. Topical imidazole creams, such as clotrimazole and miconazole, are applied sparingly to affected areas. Prescription creams, such as econazole, ketoconazole, and sulconazole, are also effective.

Vulvovaginal Candidiasis. Vaginal candidiasis accounts for 20% to 25% of vaginitis. It has been estimated that 75% of women will experience vaginal candidiasis at least once. Predisposing factors include diabetes, pregnancy, immunosuppression, and hormone replacement therapy. Pruritus is a common presenting complaint. Other symptoms may include dyspareunia, dysuria, or vaginal burning. Differential diagnosis includes sexually transmitted infection, bacterial vaginosis, and urinary tract infection. A KOH preparation will reveal hyphae and budding yeast forms.

A single 150-mg dose of fluconazole is recommended for the treatment of uncomplicated Candida vulvovaginal candidiasis. For mild cases, over the counter intravaginal imidazoles may be effective.

Infestations

Scabies

Scabies, the human itch mite, from the Latin word *scabere,* to scratch, is a human skin infestation caused by the penetration of the obligate human parasitic mite *Sarcoptes scabiei-var hominis* into the epidermis. It occurs more commonly in winter months. It is transmitted mostly through close personal contacts. It may also be spread by exposure to fomites, because the scabies mite can live off the human skin for 3 days. The average number of mites a host harbors is usually less than 20. Scabies presents with intense pruritus and rash, which usually develop after 1 to 8 weeks following exposure. The pruritus is typically worst at night. Clinical findings include small (<5 mm) papules or pustules and small raised or flattened burrows. Classically scabies affects several skin sites, and they are commonly distributed between the digital webs, sides of the fingers, volar aspects of the wrists and lateral palms, trunk, elbows, axillae, scrotum, penis, and the areola in women (Figs. 110.27 and 110.28). Scabies in infants and young children often may present with generalized involvement of the skin, including the face, scalp, palms, and soles. In infants, the most common presenting lesions are papules and vesicopustules.

In *crusted scabies* (previously known as *Norwegian scabies*), hyperkeratotic plaques develop diffusely, often on the palmar and plantar regions, with thickening and dystrophy of the toenails and fingernails. Typically with crusted scabies, a host may harbor over a million mites. Individuals with human immunodeficiency virus infection, elders, and patients with medication-induced immunosuppression are at risk of developing crusted scabies.

Scabies is a clinical diagnosis and is based primarily on the history and examination. The definitive diagnosis is made by the microscopic identification of the scabies mites, eggs, or fecal pellets *(Scybala).* There are various techniques for specimen collection, including lesion scraping, or skin biopsy.[23] Because these techniques may be impractical in the ED, treatment should be instituted based on a clinical suspicion of the diagnosis of scabies.[24]

The differential diagnosis of scabies should include pityriasis rosea, papular urticaria, secondary syphilis, folliculitis, contact dermatitis, atopic dermatitis, seborrhea, dermatitis herpetiformis, lichen planus, and psoriasis.

The first line treatment of scabies is topical permethrin 5% cream (Elimite).[25] Permethrin cream should be applied from the neck down, covering all areas of the body including under the nails, in the umbilicus, around the nipples, and genitals. Face and scalp should be treated in affected infants and young children. Preferably, it should be applied prior to bedtime, left on overnight, and then washed off 8 to 12 hours later. It is vital to treat not only the patient but family members and close contacts as well. A second treatment should be administered in 1 to 2 weeks. Alternative therapy may include single dose of ivermectin 200 µg/kg by mouth, or topical crotamiton cream. For heavily infested and or immunocompromised patients, it is recommended that ivermectin be given once a week for 2 to 3 weeks. One recent study demonstrated the efficacy of empirical therapy with a single dose of ivermectin among homeless persons with pruritus. Lindane, a previously used agent, has fallen out of favor due to potential neurotoxicity and resistance.

Equally important in the treatment is the decontamination of the clothing, bed linens, and towels by washing them in hot water and hot machine drying. Items that cannot be washed and or dry-cleaned can be decontaminated by sealing the items in an airtight container for at least 72 hours.

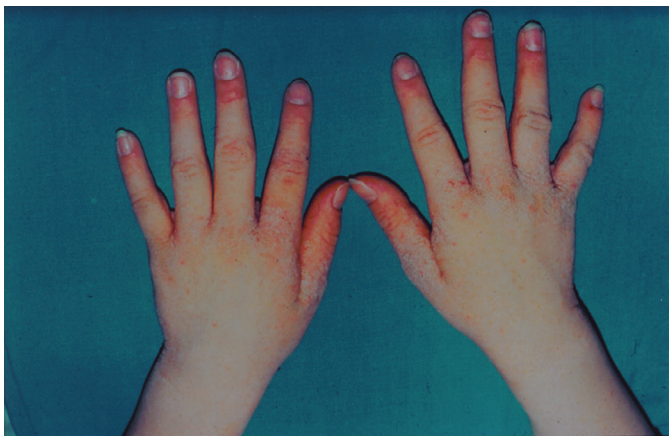

Fig. 110.27.. Scabies. (Courtesy David Effron, MD.)

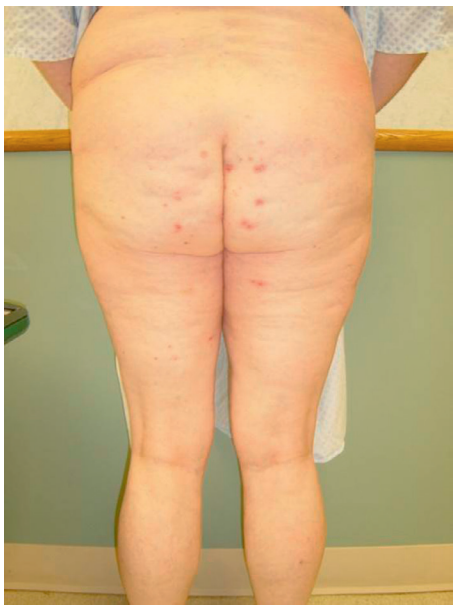

Fig. 110.28. Scabies.

Pediculosis

Pediculosis may affect the scalp hair (pediculosis capitis, caused by the mite *Pediculus humanus capitis*), body (pediculosis corporis, caused by *Pediculus humanus corporis*), or genitalia (pubic lice, caused by *Pthirus pubis*). Infestation is typically associated with significant pruritus. Lesions may be erythematous macules, papules, or wheals.

Pediculosis capitis is the most common form of lice infestation in the United States and is frequently seen in children 3 to 12 years old. An estimated 10% to 40% of school children in the United States have been infected with pediculosis capitis. It can be transmitted by sharing hair brushes, combs, and hats, and through contact with infested furniture, clothing, and linens. Hygiene and hair length are unrelated to infection. Incidence is greatest during autumn. Pediculosis capitis is less common among African American patients. Scalp, occipital, and postauricular pruritus are common in patients with pediculosis capitis. Neck and auricular erythema, papules, vesicles, and lymphadenopathy may be seen.

Pediculosis corporis can present with intense pruritus and erythematous macules or wheals. Pediculosis corporis typically occurs in patients with poor hygiene or living in crowded conditions.

Pediculosis pubis ("crabs") is a sexually transmitted disease and is most commonly seen among young adults. Other concurrent sexually transmitted diseases should be considered and ruled out.

The differential diagnosis includes conditions, such as tinea capitis, seborrheic dermatitis, atopic dermatitis, eczema, scabies, folliculitis, and contact dermatitis.

The diagnosis of pediculosis is made by identification of lice or nits on the hair shaft (Fig. 110.29). Nits, which appear as white dots or grains, are more easily identified than the actual louse. Nits fluoresce with the Wood's lamp. Examination with a louse comb improves the diagnostic accuracy and is faster than direct visualization.

Therapy for pediculosis should be initiated with a pediculicide, such as permethrin 1% (Nix, Lyclear), which is effective in 90% of cases.[26] Permethrin should be applied to the dry scalp and hair and remain for 10 minutes. Treatment should be repeated in 1 week to kill any newly hatched lice. Spinosad 0.9% suspension (Natroba) is a new agent with demonstrated pediculicidal efficacy.[27,28] Spinosad 0.9% is approved for use in patients older than 4 years old and is also effective against permethrin-resistant populations of lice. Spinosad is ovicidal, killing both eggs (nits) and lice; thus extensive nit combing is not necessary. However, the cost may be prohibitive. Oral ivermectin (Stromectol, Mectizan) has demonstrated pediculicidal efficacy.[29,30] Topical ivermectin lotion has also demonstrated safety and efficacy.[31] Other treatments may be considered, including malathion, albendazole or thiabendazole, benzyl alcohol lotion (Ulefsia), or levamisole (Ergamisol).[32] Lindane, an older therapy, should be reserved for unusual cases of resistance to first line agents, because of neurotoxicity and poor pediculicidal activity. Over the counter products have variable success rates, in part due to resistance. Nits should be removed with a special fine-toothed comb. The environment should also be treated. Hats, hair brushes and combs, and linens as well as clothing should be treated. Items should be boiled or washed and dried at high temperatures. Floors and furniture should be vacuumed. Fumigation is not necessary. Family members should be examined and treated if infested. Sexual partners of patients with pediculosis pubis should be treated. The American Academy of Pediatrics recommends that children do not miss school because of head lice.[33]

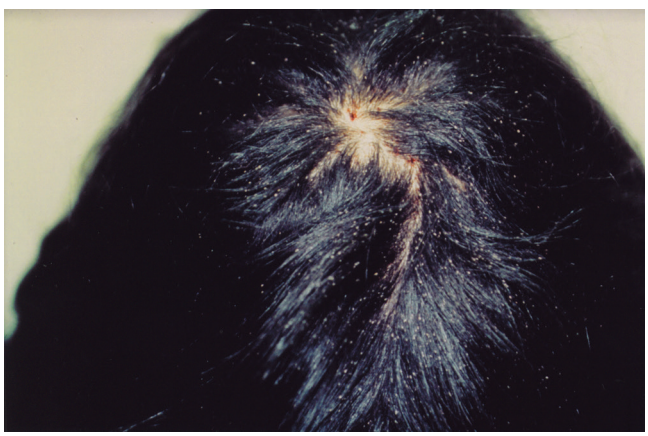

Fig. 110.29. Nits as seen in head lice. (Courtesy David Effron, MD.)

Bed Bugs

Bed bugs *(Cimex lectularius)* appear brown, approximately 5 to 6 mm in length. Bed bugs may be vectors for many fungi, viruses, and bacteria, including MRSA and vancomycin-resistant *Enterococcus faecium*, although human illness from bed bugs as carriers has not been documented.[34] Bed bugs are found not only in linens, but on furniture, luggage, and in walls, baseboards, and buildings. They often feed on humans at night with a painless bite.

Clinical presentation may appear as erythematous welts, macules, papules, urticaria, purpura, vesicles, or bullae, with intense pruritus. The distribution is often over uncovered areas, such as arms, legs, and shoulders. Lesions resolve spontaneously in 1 to 2 weeks. Symptomatic treatment should be undertaken with antihistamines and topical corticosteroids.[35,36] A patient with a scaly, persistent pruritic eruption should be treated with permethrin 5% cream, ivermectin, or crotamiton. Eradication from the environment is challenging, due in part to increasing resistance to insecticides. Eradication methods may include insecticides, heat, steam, freezing, or vacuuming. The hazards of widespread insecticide use, including potential for malignancy or CNS adverse effects, have created a dilemma of eradication.

ALLERGIC REACTIONS

An in depth discussion of systemic allergic reactions and anaphylaxis can be found in Chapter 109.

Contact Dermatitis

Contact dermatitis is an inflammatory reaction of the skin to a chemical, physical, or biologic agent, which acts as an irritant or allergic sensitizer. Allergic contact dermatitis is a form of delayed hypersensitivity mediated by lymphocytes sensitized by the contact of the allergen to the skin. It is less common than irritant contact dermatitis. Caustics, industrial solvents, and detergents are common causes of irritant dermatitis. Clothing, jewelry, soaps, cosmetics, latex, plants, and medications contain allergens that commonly cause allergic contact dermatitis. The most common allergens include rubber compounds; plants of the *Toxicodendron* species, including poison ivy, oak, and sumac; nickel, often used in jewelry alloys; paraphenylenediamine, an ingredient in hair dyes and industrial chemicals; and ethylenediamine, a stabilizer in topical medications.

The primary lesions of contact dermatitis are papules, vesicles, and bullae on an erythematous base. Streaky, linear, intensely pruritic lesions are characteristic. A pattern in the region in contact with the allergen is typical (Fig. 110.30). Eruptions associated with contact dermatitis can appear as soon as several hours after the exposure or may be delayed for days.

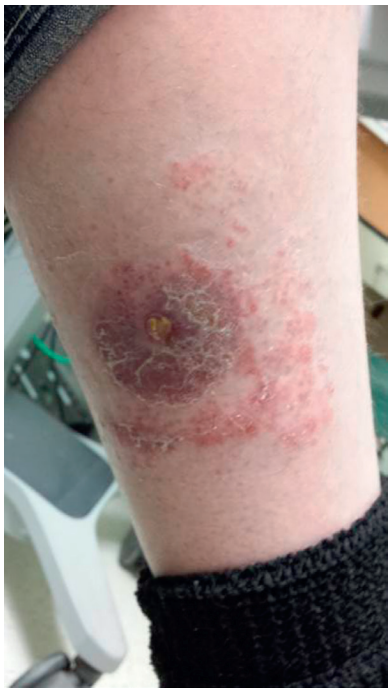

Fig. 110.30. Neomycin allergy. (Courtesy Joanna Marco, MD.)

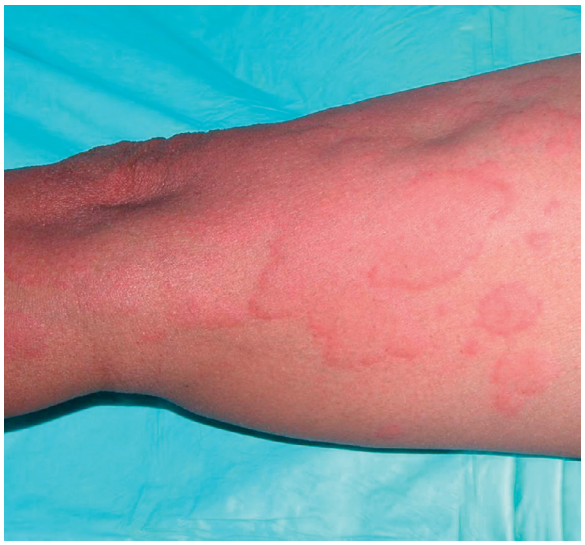

Fig. 110.31. Urticaria. (Courtesy David Effron, MD.)

Treatment of contact dermatitis includes avoidance of the irritant or allergen and treatment of inflammation. Low-potency topical steroid creams may be applied to erythematous areas around natural orifices and medium-potency creams can be used elsewhere. Topical steroids are ineffectual on blistered areas. Oozing or vesiculated lesions should be treated with cool wet compresses of Domeboro or Burow's solutions (aluminum acetate). Topical baths, available over the counter, may also be comforting. Systemic antihistamines, such as hydroxyzine and diphenhydramine, may help control pruritus; nonsedating antihistamines are preferred for use during the day. If present, secondary bacterial infection must also be treated.

Urticaria

Urticaria may occur in isolation or as part of a systemic anaphylactic reaction. The following discussion pertains to urticaria occurring in the absence of systemic symptoms. Anaphylactic reactions and angioedema are discussed in Chapter 109. Approximately 15% to 20% of the population experiences urticaria during their lifetime. Acute urticaria is seen in both sexes and is more likely to have an allergic cause. Chronic urticaria is more common in women in their 40s and 50s. Half of all patients with chronic urticaria have the disease for 5 years and one-fourth for 20 years.

Various mediators, including histamine, bradykinin, kallikrein, and acetylcholine, are thought to play a role in urticaria production. Urticaria may be initiated by immunologic or nonimmunologic mechanisms. Nonimmunologic urticaria may be produced by degranulation of mast cells, which may be caused by a number of foods and drugs, including aspirin and narcotics.

Almost any medication may produce urticaria, although penicillin and aspirin are the most common. Traces of penicillin may be present in dairy products, as well as in medications. The mechanism of production of urticaria by aspirin is unknown but is probably nonimmunologic, and the effects of aspirin may persist for a number of weeks after ingestion. The role of medications in the production of urticaria is discussed in the section on drug reactions. Substances that can cause urticaria by contact with the skin include foods, textiles, animal dander and saliva, plants, topical medications, chemicals, and cosmetics. A variety of food allergies, such as seafood, tree nuts, peanuts, and eggs, may result in urticaria. In addition, foods such as lobster and strawberries can release histamine through a nonimmunologic mechanism.

Infection is a common cause of urticaria. Viral infections that produce urticaria include rhinovirus, rotavirus, hepatitis, mononucleosis, and coxsackievirus infections. Occult infections with *Candida,* the dermatophytes, bacteria, viruses, and parasites may also cause urticaria.

Inhalation of pollens, mold, animal dander, dust, plant products, and aerosols may produce urticaria. Respiratory symptoms may accompany the dermatosis, and a seasonal pattern of occurrence may be present. Stings and bites of insects, arthropods, and various marine animals may also produce an urticarial eruption.

On occasion, patients with systemic lupus erythematosus, lymphoma, carcinoma, hyperthyroidism, rheumatic fever, and juvenile rheumatoid arthritis develop an urticarial eruption.

A number of physical agents produce urticaria. Dermatographism is present when firm stroking of the skin produces an urticarial wheal within 30 minutes and is the most common form of physical urticaria. Pressure urticaria is distinct from dermatographism in that the onset of urticaria is delayed by 4 to 8 hours after the application of physical pressure.

Cold urticaria may be either familial or, more commonly, acquired. Cold urticaria may also be associated with underlying illness, such as cryoglobulinemia, cryofibrinogenemia, syphilis, and connective tissue disease. Nonsedating antihistamines, such as rupatadine, help suppress primary cold urticaria.[37] Antihistamines taken 30 to 60 minutes before cold exposure may be helpful. Cholinergic urticaria is induced by exercise, heat, or emotional stress. It may be associated with pruritus, nausea, abdominal pain, and headache. The lesions of cholinergic urticaria are wheals 1 to 3 mm in diameter surrounded by extensive erythematous flares and, occasionally, satellite wheals. Nonsedating antihistamines are generally used to treat cholinergic urticaria.

Heat is a rare cause of hives. Solar urticaria, also uncommon, is confined to sun-exposed areas of skin and clears rapidly when the light stimulus is removed. Extensive sun exposure may cause wheezing, dizziness, and syncope in a susceptible individual. Sunscreens have not been proven to be effective for the prevention of solar urticaria. Phototherapy may be used to induce tolerance.

Urticaria appears as edematous plaques with pale centers and red borders and is easily recognizable (Fig. 110.31). Individual hives are typically transient, lasting less than 24 hours, although

new lesions may continuously develop, which represents localized dermal edema produced by transvascular fluid extravasation.

The differential diagnosis of urticaria includes drug eruption, exanthems, erythema multiforme, erythema marginatum, and juvenile rheumatoid arthritis.

Treatment of urticaria involves the removal of the inciting factor, when applicable, and the administration of antihistamines or other antipruritics. Hydroxyzine (Atarax, Vistaril) is usually effective in providing symptomatic relief. For chronic urticaria, long-term therapy with antihistamines may be needed. Nonsedating antihistamines are preferred. Cetirizine, fexofenadine, or loratadine can be used. A single dose of an H_2 blocker may be added.

Steroids may be a useful adjunctive therapy.[38] Patients with moderate or severe urticaria may benefit from prednisone or dexamethasone. Patients with recurrent urticaria may benefit from longer courses of oral steroids (14 to 21 days with a taper). Chronic administration of steroids is not recommended.

Patients with chronic urticaria may be treated with a prescription for a combination of an H_1 and H_2 antihistamine. Strong evidence supporting addition of an H_2 blocker is lacking.[39] For patients with recurrent urticaria, a prescription of injectable epinephrine may be indicated.

Poison Ivy

Toxicodendron species often result in vesicular or bullous eruptions. Oozing, crusting, scaling, and fissuring may be found along with lichenification in chronic lesions. The distribution of the eruption depends on the specific contact and may be localized, asymmetric linear, or unilateral (Fig. 110.32). Mucous membranes are usually spared unless they are directly exposed to the inciting agent. Sensitization to poison ivy results in sensitization to other plants in this family, such as cashew, mango, lacquer, and ginkgo trees.

In addition to the aforementioned treatment regimens for contact dermatitis, a course of systemic corticosteroids may be indicated to treat *Toxicodendron*-associated dermatitis. A tapering dose of prednisone for 21 to 30 days may be indicated to prevent rebound of the disease. Patients should be counseled to wash all clothes or items that might have contacted the plant because the irritant plant oil can persist. Once the offending agent is reliably removed from the skin and clothes, ongoing outbreak is attributable to the initial contact, not spread from the serous fluid from the bullae. The patient is not contagious to others unless there is direct contact with the plant oil in people who are sensitized.

DRUG REACTIONS

Reactions to medications are common and are estimated to occur in 1% to 5% of patients. Cutaneous reactions are the most common type of reaction. Many medications have the potential to produce a drug reaction. Patients at higher risk of drug reactions include those with immunodeficiency, certain infections, and genetic predisposition. The most common eruptions are a morbilliform rash (Fig. 110.33), urticaria, or fixed drug eruption.[40] More severe reactions may include vasculitis, erythema nodosum, angioedema, anaphylaxis, Stevens-Johnson syndrome, toxic epidermal necrolysis, blistering dermatoses, drug-induced lupus, lichenoid drug eruptions, psoriasiform drug eruptions, drug-induced neutrophilic dermatoses (ie, Sweet's syndrome, erythema nodosum, and pyoderma gangrenosum), and cutaneous lymphoma-like drug reactions.[41,42]

Drug reactions often appear within 4 to 21 days after the drug is taken. Skin lesions may appear after a drug has been discontinued and may worsen if the drug or its metabolites persist in the system. Special note should be made of penicillin, because it is a common cause of drug reaction. Serum sickness and urticaria are common manifestations of penicillin allergy. Geriatric patients, patients with HIV infection, atopic patients, and those with a history of hay fever, asthma, or eczema are at increased risk.

A variety of skin reactions are associated with drug reactions. Exanthematous drug eruptions, including maculopapular and morbilliform drug eruption, are the most common type of cutaneous manifestation and account for over 80% of reactions.[43] Clinical presentation is typically a widespread symmetric eruption of pink or red macules and papules which may become confluent. Severe cases may progress to exfoliative dermatitis.

Other presentations may include urticarial, eczematous drug rash, vasculitis, photosensitive drug reactions, or fixed drug eruption. Fixed drug eruptions appear and recur at the same anatomic site after repeated exposure to the same drug. The lesions are usually sharply marginated and round or oval. They may be pigmented, erythematous, or violaceous. Pruritus may be prominent.

Treatment of drug eruptions begins with discontinuation of the inciting agent. Most cutaneous drug reactions fade within 1 week of discontinuation. Antihistamines, H_2-antagonists, and topical or systemic steroids may be indicated.

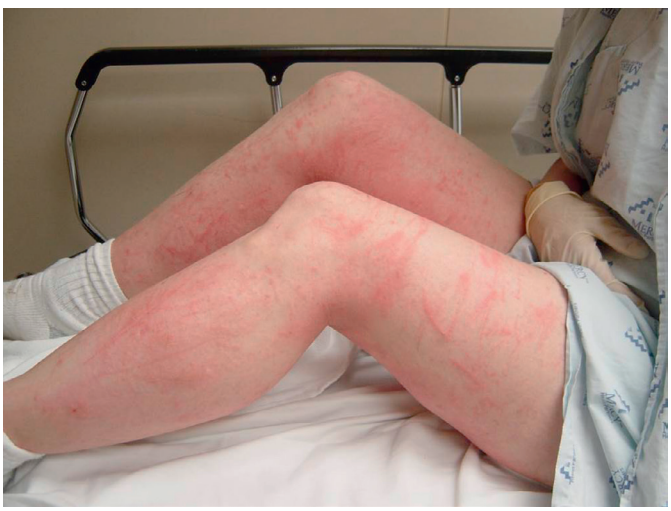

Fig. 110.32. Toxicodendron (poison ivy).

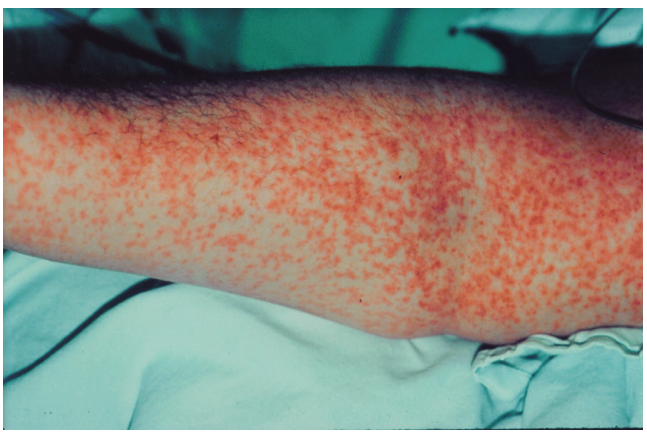

Fig. 110.33. Morbilliform drug eruption. (Courtesy David Effron, MD.)

Severe reactions, such as toxic epidermal necrolysis, Stevens-Johnson syndrome, and hypersensitivity reactions warrant hospitalization.

INFLAMMATORY CONDITIONS

Atopic Dermatitis

Atopic dermatitis is a common dermatologic condition often referred to as *eczema* or *chronic dermatitis*. Atopic dermatitis is the cutaneous manifestation of an atopic state, and although it is not an allergic disorder, it is associated with allergic diseases, such as asthma and allergic rhinitis. Patients with atopic dermatitis are known to have abnormalities of both humoral and cell-mediated immunity. The exact mechanism is unclear, but eosinophil, mast cell, and lymphocyte activation triggered by increased production of interleukin-4 by specific T helper cells seems to be involved. The course of atopic dermatitis involves remissions and exacerbations. More than 90% of patients have the onset of atopic dermatitis before 5 years old.

Atopic dermatitis is an inflammatory skin condition. Diagnostic criteria include itchy skin plus three or more of the following: history of flexural involvement, generalized dry skin in the past year, history of asthma or hay fever, onset of rash before 2 years old, and flexural dermatitis.

Skin lesions generally appear as inflammatory thickened, papular, or papulovesicular lesions. The skin is typically dry and may be scaly, but in the acute phase, it may also be vesicular, weeping, or oozing. In the chronic stage, lesions are thickened and lichenified.

The distribution of lesions varies with the age of the patient. In infants, inflammatory exudative plaques are seen on the cheeks, on the extensor surfaces, and in the diaper area. Older children and adults have lesions in the antecubital and popliteal flexion areas, neck, face, and upper chest. Infantile atopic dermatitis usually begins in the fourth to sixth month of life and improves by the third to fifth year of life. The childhood form occurs between 3 and 6 years old and resolves spontaneously or continues into the adult form.

Intense pruritus is a hallmark of atopic dermatitis. During flares, patients may present with complaints of intense itching and failure of routine treatments to control their symptoms. Patients may also present with secondary infections. The itching may be focal or generalized, is worse during the winter, and is triggered by increased body temperature and emotional stress. It may be particularly annoying at night. Excoriations may be prominent, and secondary bacterial infection of excoriated lesions is common. Repeated scratching and rubbing produce lichenification, a condition of hyperpigmentation, thickening of the skin, and accentuation of skin furrows. Lichenification is a common feature of chronic atopic dermatitis.

Treatment should be aimed at control of inflammation, dryness, and itching. Management includes a careful review of daily skin care with patients or caregivers. General recommendations for all patients include avoidance of nonspecific skin irritants, wool, nonessential toiletries, and detergents and use of cotton clothing as much as possible.

Topical corticosteroids are the cornerstone of therapy and are often best prescribed in ointment form. Approximately 80% of patients have improvement of symptoms with topical steroid treatment. When the dermatitis is severe, the application of a fluorinated corticosteroid ointment such as half-strength betamethasone valerate is recommended to affected areas three times a day. Fluorinated corticosteroids should not be used on the face, because they can produce cutaneous atrophy. Milder corticosteroid preparations, such as 0.025% triamcinolone ointment, may be used on the face and intertriginous areas. Patients with extremely severe disease may require systemic steroids. Ultraviolet B treatment is moderately effective. Cyclosporine and other immunosuppressant agents are being used with some promising benefit. Further studies are needed to determine ideal dosing and safety profiles for these agents.

Skin dryness is treated with lubricating ointments such as Vaseline or 10% urea in Eucerin cream (not lotion). Treatment of exudative areas includes the application of wet dressings, which are useful for their moisturizing, antiinflammatory, and antipruritic actions. Two or three layers of gauze soaked in Burow's solution should be applied for 15 to 20 minutes four times a day for exudative lesions. Antihistamines may be helpful in reducing the pruritus and are also useful for their sedative and soporific effects, although there is no convincing evidence that H_1 antihistamines decrease itching in patients with atopic eczema.

Inpatient admission is a consideration for those patients who have generalized erythema and exfoliation (erythroderma) or intractable itching in that skin breakdown and severe secondary bacterial or viral skin infections may occur.

Patients with atopic dermatitis are susceptible to infection and colonization by a variety of organisms because of their defective skin barrier functions and local skin immunodeficiency. Widespread disseminated viral infections, such as eczema molluscum, eczema vaccinatum, and eczema herpeticum, and recurrent staphylococcal pustulosis are especially concerning.

Pityriasis Rosea

Pityriasis rosea is a mild skin eruption predominantly found in children and young adults. The etiology is unknown, although viral, bacterial, and fungal etiologies have been implicated. Ages 10 to 35 years are commonly affected. Clinical presentation includes multiple pink or pigmented oval papules or plaques 1 to 2 cm in diameter on the trunk and proximal extremities. A history may reveal an initial larger patch ("herald patch") that precedes the widespread eruption (Figs. 110.34 and 110.35). Mild scaling may be present. The lesions are parallel to the ribs, forming a Christmas tree–like distribution on the trunk and extremities. Oral lesions are rare. In children, papular or vesicular variants of the disease may occur. The eruption is usually asymptomatic, although pruritus may be present. The differential diagnosis includes tinea corporis, guttate psoriasis, lichen planus, drug eruption, Lyme disease, and secondary syphilis.

Pityriasis rosea is self-limited, resolving in 8 to 12 weeks. Recurrences are rare. Treatment should include supportive care, including alleviation of pruritus. Topical zinc oxide and calamine lotion are useful for pruritus. If the disease is severe or widespread (eg, vesicular PR), topical or oral steroids may be used. No restriction of activity or isolation is indicated.

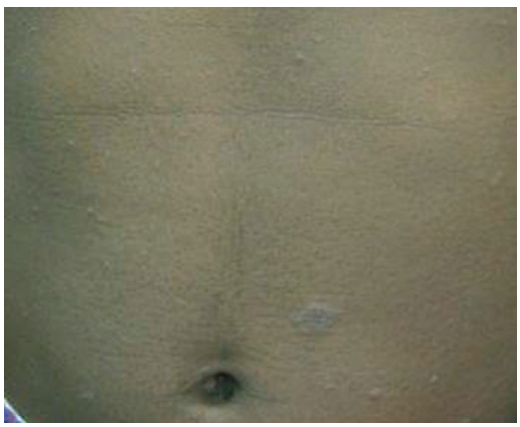

Fig. 110.34. Herald patch of pityriasis rosea.

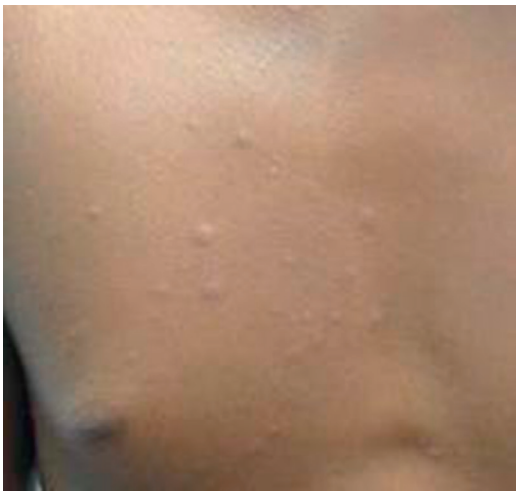

Fig. 110.35. Pityriasis rosea.

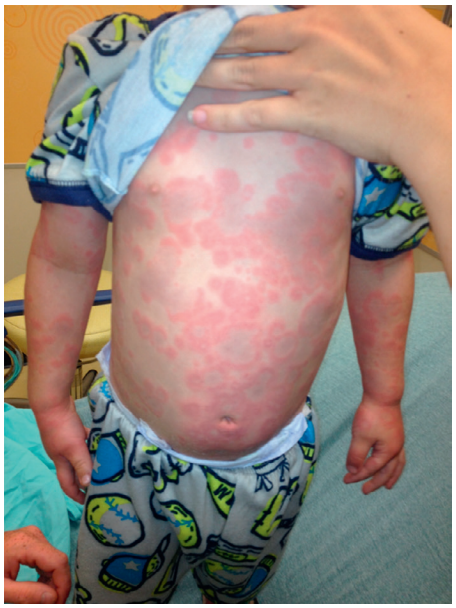

Fig. 110.36. Erythema multiforme.

Kawasaki Disease (Mucocutaneous Lymph Node Syndrome)

Kawasaki disease (mucocutaneous lymph node syndrome) is one of the most common vasculidities of childhood. It is seen in infants and young children. The peak age is between 1 and 2 years old. The disease is very uncommon in children older than 14 years old or in adults. It is more common in boys. Although cases of Kawasaki disease have been reported in children of all ethnic origins, the highest incidence is among children of Asian descent. The disease typically occurs in winter and spring and is usually self-limiting, resolving spontaneously without treatment within 2 to 4 weeks. However, 15% to 20% of cases will have complications, such as damage to coronary arteries, leading to myocardial infarction and heart failure.

Clinical features are characterized by three phases. The acute febrile period (phase I) is manifested by the abrupt onset of fever, lasting approximately 12 days. During phase I, cutaneous findings include erythematous lesions and on the palms and soles. Within 2 days, the blotchy, erythematous, macular lesions spread to the extremities and trunk. Nonexudative injected conjunctivae, seen in approximately 90% of patients, may be present for 1 to 3 weeks. Diffuse oropharyngeal erythema with "strawberry" tongue is often present. Symptoms of diarrhea, arthritis, and photophobia may be present. In the subacute phase (phase II), desquamation, thrombocytosis, arthritis, arthralgias, and carditis may be present. This phase may last 30 days. There is a high risk for sudden death during this phase of the illness if it has gone untreated. During the convalescent phase (phase III), which occurs within 8 to 10 weeks after the onset of the illness, most signs of the illness have resolved. Coronary aneurysms present in 25% of cases and may be diagnosed by echocardiography or coronary angiography.

For epidemiologic surveillance, the Centers for Disease Control and Prevention (CDC) defines a case of Kawasaki disease as illness in a patient with fever of 5 or more days duration, and the presence of at least four of the following five clinical signs:

- Rash
- Cervical lymphadenopathy (at least 1.5 cm in diameter)
- Bilateral conjunctival injection
- Oral mucosal changes
- Peripheral extremity changes.

The diagnosis is typically made based on clinical findings. Laboratory tests that support the diagnosis include elevated liver function tests, leukocytosis, thrombocytosis and an elevated C-reactive protein (CRP). The ESR is elevated during phase II and returns to normal in phase III. Pyuria may be seen on urinalysis. Electrocardiography (ECG) may show PR and QT prolongation or acute ST/T wave changes.

Management of Kawasaki disease includes hospital admission, high dose intravenous immune globulin (IVIG) (2 g/kg single dose) therapy, and aspirin therapy (80 to 100 mg/kg per day). Treatment with IVIG within the first 10 days of illness reduces the incidence of coronary artery aneurysms fivefold compared with children not treated with IVIG. Early cardiology evaluation is important to identify and treat possible coronary artery involvement.

An in depth discussion of Kawasaki disease can be found in Chapter 170.

Erythema Multiforme

Erythema multiforme is considered to be a hypersensitivity reaction, and it may be caused by a drug reaction; HSV infection and other viral infections, especially hepatitis and influenza A; fungal diseases, such as dermatophytosis, histoplasmosis, and coccidioidomycosis; and bacterial infections, especially streptococcal infections and tuberculosis. Various collagen vascular disorders have been known to precipitate erythema multiforme, including rheumatoid arthritis, systemic lupus erythematosus, dermatomyositis, and periarteritis nodosa. Pregnancy and various malignant neoplasms have also been associated with erythema multiforme. The etiology is unknown in approximately 50% of cases. Differential diagnosis includes urticaria, scalded skin syndrome, pemphigus, and pemphigoid and viral exanthems.

Erythema multiforme is an acute, usually self-limited disease. It is characterized by skin lesions that are erythematous or violaceous macules, papules, vesicles, or bullae. Their distribution is often symmetric, most commonly involving the soles and palms, the backs of the hands or feet, and the extensor surfaces of the extremities. The presence of lesions of the palms and soles is particularly characteristic. The target lesion with three zones of color is the hallmark of erythema multiforme (Fig. 110.36). It is a central, dark papule or vesicle that is surrounded by a pale zone, a halo of erythema, and is commonly found on the hands or wrists.

Treatment begins with treatment of the underlying cause. Mild forms with no systemic symptoms, lesions limited to extremities,

and no mucous membrane involvement typically resolve spontaneously in 2 or 3 weeks. Patients with lesions on the trunk and patients who are immunocompromised, especially those with multiple lesions, require a course of systemic steroids for 14 to 21 days with a taper and urgent dermatology referral. Patients with mucous membrane involvement, systemic symptoms, or vesicle formation raise concern for Stevens-Johnson syndrome.

Toxic Epidermal Necrolysis

Stevens-Johnson syndrome and toxic epidermal necrolysis are considered a continuous spectrum of the same disease, an immune-complex–mediated hypersensitivity reaction. Stevens-Johnson syndrome is considered a minor form of toxic epidermal necrolysis with less than 10% body surface area (BSA) involved. Toxic epidermal necrolysis includes patients with more than 30% BSA involved. There is overlap with patients with 10% to 30% BSA involved. The main feature of non–staphylococcal-induced toxic epidermal necrolysis, or Lyell's disease, is the separation of large sheets of epidermis from underlying dermis. Toxic epidermal necrolysis may be caused by medications, infection, malignancy, or idiopathic (30% to 50% of cases). Medications that can cause toxic epidermal necrolysis include sulfa drugs, nonsteroidal antiinflammatory drugs (NSAIDs), penicillin, aspirin, barbiturates, phenytoin, carbamazepine, or allopurinol.

Mortality may be up to 30% with toxic epidermal necrolysis. Risk factors for poor prognosis include age older than 40 years old, underlying malignancy, heart rate more than 120, initial percentage of epidermal detachment more than 10%, BUN level more than 10 mmol/L, serum glucose level more than 14 mmol/L (or 252 mg/dL), and bicarbonate level less than 20 mmol/L.

Toxic epidermal necrolysis commonly begins with prodromal symptoms, such as fever, malaise, rhinitis, sore throat, and myalgias. These are followed by the abrupt development of a macular rash that may appear as target lesions. The extremities are commonly involved, although any area may be affected. The exanthem becomes confluent, and dermal-epidermal dissociation ensues; Nikolsky's sign (denudation with shear stress) is present, and the skin is commonly painful to the touch (Fig. 110.37). Mucous membrane involvement may occur with erythema, blistering, sloughing, or necrosis (Fig. 110.38). Involvement of the conjunctivae and cornea may lead to permanent scarring and blindness. Systemic involvement may occur, with renal, gastrointestinal, or respiratory tract lesions, resulting in hematuria, diarrhea, bronchitis, or pneumonia. Morbidity and mortality are often related to infection and dehydration.

The treatment of Stevens-Johnson syndrome and toxic epidermal necrolysis includes discontinuation of the offending agent and supportive care, including hydration, prevention of secondary infection, and expert wound management. This is usually best accomplished in a center with burn care expertise. Systemic administration of corticosteroids is controversial. They have little effect on the disease and may mask signs of impending sepsis. High-dose IVIG may be administered to patients with severe toxic epidermal necrolysis or Stevens-Johnson syndrome. Plasmapheresis is considered in consultation with a specialist.

An in depth discussion of Stevens-Johnson syndrome and toxic epidermal necrolysis can be found in Chapter 129.

Erythema Nodosum

Erythema nodosum is an inflammatory reaction of the dermis and adipose tissue that presents with painful erythematous or violaceous subcutaneous nodules. These painful nodules occur most commonly over the anterior tibia but may also be seen on the arms or body (Fig. 110.39). Fever and arthralgia of the ankles and knees may precede the rash. As the lesions evolve, they may turn yellow-purple and resemble bruises. Women are affected three times more often than men, with the highest incidence in the third to fifth decades of life. Unless lesions quickly resolve, a search for underlying conditions should be undertaken.

A number of diseases are associated with erythema nodosum; these include drug reactions, sarcoidosis, coccidioidomycosis,

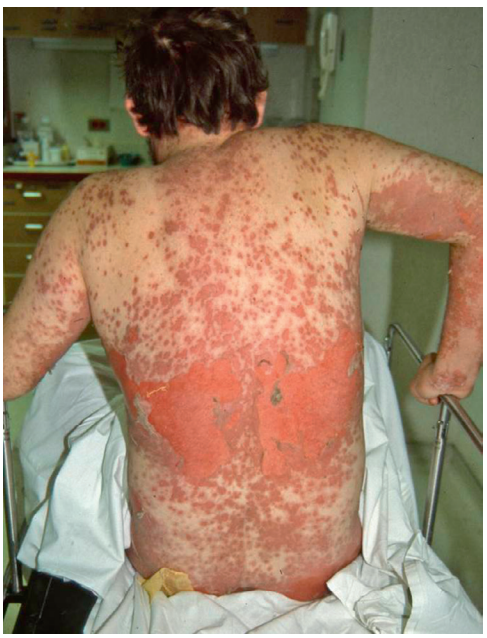

Fig. 110.37. Toxic epidermal necrolysis. (Courtesy David Effron, MD.)

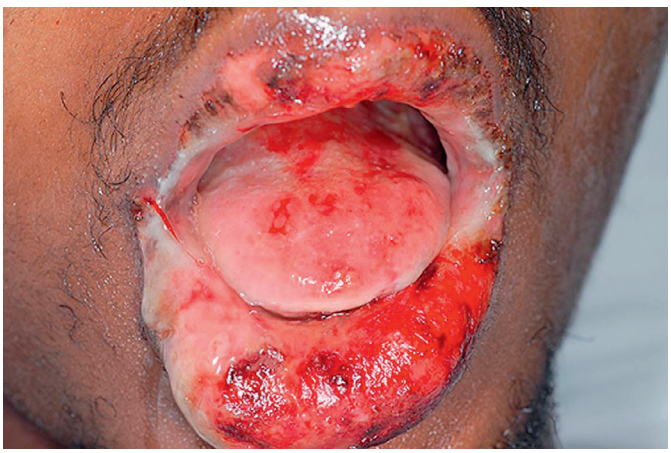

Fig. 110.38. Toxic epidermal necrolysis. (Courtesy David Effron, MD.)

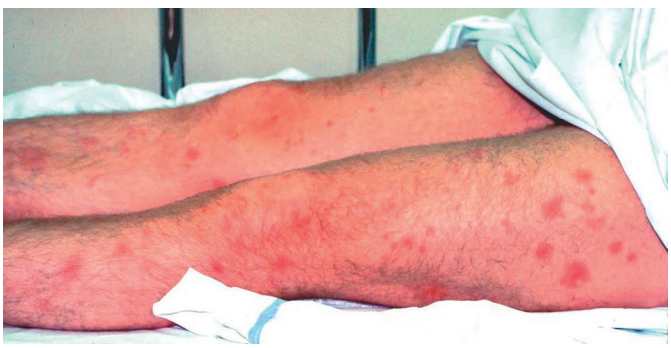

Fig. 110.39. Erythema nodosum. (Courtesy David Effron, MD.)

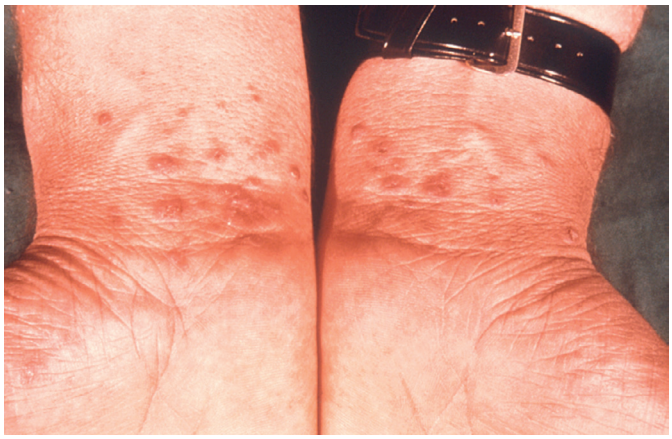

Fig. 110.40. Lichen planus. (Courtesy Centers for Disease Control and Prevention [CDC] Public Health Image Library, Susan Lindsley.)

histoplasmosis, tuberculosis, ulcerative colitis, regional enteritis, pregnancy, and infections with streptococci, *Yersinia enterocolitica,* and *Chlamydia*. As with erythema multiforme, many cases of erythema nodosum are idiopathic. The differential diagnosis includes traumatic bruises and subcutaneous fat necrosis.

Management begins with treatment of the underlying etiology. Chest radiography may be considered to rule out sarcoidosis, tuberculosis, or pulmonary fungal infection. Bed rest, elevation of the legs, and wearing of elastic stockings reduce pain and edema. Aspirin in a dosage of 650 mg every 4 hours or other NSAIDs may also afford some relief. Erythema nodosum is a self-limited process that usually resolves in 3 to 8 weeks. Patients with severe pain may be treated with potassium iodide daily for 3 or 4 weeks. Potassium iodide may act through an immunosuppressive mechanism mediated by heparin release from mast cells.

Lichen Planus

Lichen planus is an inflammatory condition of unknown etiology. Lesions are typically flat-topped violaceous papules with pruritus (also known as the five "Ps": purple, planar, polygonal, pruritic, papules). Lesions typically appear on the wrists and ankles (Fig. 110.40). The lesions may occur in an area of trauma (Koebner phenomenon). Other areas may be affected, such as oral mucosa, anogenital region, scalp, and other areas.

High potency topical steroids are treatment of choice. Pruritus may be treated with systemic agents, such as diphenhydramine or hydroxyzine. Alternate therapies include systemic steroids, oral retinoids, or phototherapy.[44]

AUTOIMMUNE DISORDERS

Bullous Pemphigoid

Bullous pemphigoid is an autoimmune blistering disorder that most commonly affects geriatric patients. Clinical manifestations are often pruritus and generalized blistering of the skin (Fig. 110.41). Nikolsky's sign is negative. It often has a waxing and waning clinical course. Although unproven, it has been associated with numerous systemic conditions, including malignancy, diabetes, stroke, Parkinson's disease, and cardiovascular disease.

Systemic steroids are the treatment of choice. Topical steroids may be used for cases of localized or limited disease. Other treatment modalities may include azathioprine, cyclophosphamide, methotrexate, and other agents. These treatments should be undertaken in consultation with a dermatologist.[45]

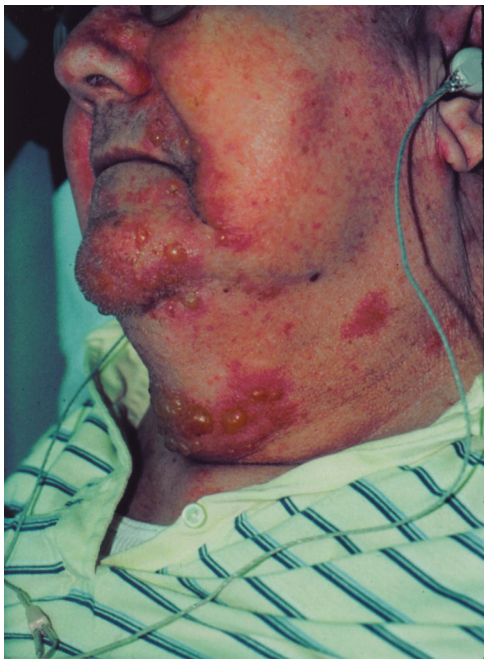

Fig. 110.41. Bullous pemphigus. (Courtesy David Effron, MD.)

Pemphigus Vulgaris

Pemphigus vulgaris is an uncommon but important dermatologic disorder. The mortality rate before the use of steroids was approximately 95%. The current mortality rate is 10% to 15%, with appropriate treatment. Pemphigus is a bullous disease, affecting both sexes equally, and is most common in patients 40 to 60 years old. The disease is mostly prevalent in people of Jewish, Mediterranean, or south Asian descent.

The typical skin lesions are small, flaccid bullae that break easily, forming superficial erosions and crusted ulcerations. Any area of the body may be involved. Nikolsky's sign is present and characteristic of the disease. Nikolsky's sign is positive when gentle rubbing of the skin produces exfoliation of the outermost layer, forming a blister or bullae.

Many patients also have oral lesions (50% to 60%). The oral lesions typically antedate the cutaneous lesions by several months. The most common site is in the mouth, especially the gums and vermilion borders of the lips. Oral lesions are bullous but commonly break, leaving painful, denuded areas of superficial ulceration.

Pain control and local wound care are essential components of therapy. Once the diagnosis is made, treatment with oral glucocorticoids in initial doses of 100 to 300 mg of prednisone, or an equivalent drug, should be instituted in conjunction with a dermatologist. Other immunosuppressant drugs may also be used. Morbidity and mortality may ensue, related to an uncontrolled spread of the disease, secondary infection, dehydration, side effects of steroid therapy, and thromboembolism.

CUTANEOUS MALIGNANCIES

Approximately 5 million skin cancers are diagnosed annually in the United States.[46] The most common cutaneous malignancies are basal cell carcinoma, squamous cell carcinoma, and melanoma.[47-49]

Basal cell carcinoma is the most common skin cancer in the United States. It is more common among men. Basal cell carcinomas are commonly seen in patients with fair skin, sun exposure, outdoor occupation, and older age. Clinical presentation is

typically on sun exposed areas, commonly on the head and neck. The typical appearance is a pearly papule with well-defined borders and telangiectasias, although several variants may be seen. Suspicious lesions should be referred to a dermatologist for biopsy.

Squamous cell carcinoma is the second most common skin cancer in the United States. It is more common in men than in women. The risk of developing squamous cell carcinoma of the skin is increased with advancing age and sun exposure. Squamous cell carcinomas are typically found in sun-exposed areas, most commonly on the head and neck. The appearance is typically an irregular growth with erythema, induration, inflammation, crusting, or oozing. Suspicious lesions should be referred to a dermatologist for biopsy.

Melanoma is less common, and accounts for only 4% to 5% of skin cancers. However, it is responsible for most deaths from cutaneous malignancies. Risk factors include fair skin, dysplastic nevi, multiple (>50) nevi, prior history of melanoma, family history of melanoma, immunocompromised state, and xeroderma pigmentosum. Melanoma tends to appear more often on lower extremities in women and on the head, neck, and trunk in men, and it may occur in any area of the skin. The typical appearance is an asymmetric lesion with irregular pigmentation, border, and texture, and diameter greater than 6 mm or increasing in size. Suspicious lesions should be referred to a dermatologist for biopsy.

Kaposi sarcoma appears more often in men having sex with men than in other risk groups. Clinically, it presents with painless, raised, brown-black or purple papules and nodules that do not blanch. Common sites are the face, chest, genitals, and oral cavity, but widespread dissemination involving internal organs may occur. Because cutaneous Kaposi sarcoma is not generally associated with morbidity or mortality, therapy is indicated only for extensive, painful, or cosmetically disfiguring lesions.

Although the ED does not provide definitive management for cutaneous malignancies, recognition of possible malignant lesions may facilitate prompt and expeditious referral for definitive management. Any lesion with irregular pigmentation, irregular borders or texture, easy bleeding, or recent change in lesion should be referred to a dermatologist.

SKIN CONDITIONS ASSOCIATED WITH SYSTEMIC DISEASE

Systemic illness should be considered with significant generalized dermatologic presentations. Systemic illness should be suspected in patients with systemic symptoms, such as fever, fatigue, weight loss or gain, weakness, immunosuppression, or other generalized symptoms. Systemic illnesses with cutaneous findings may include systemic infections, autoimmune or connective tissue disorders, malignancies, diabetes mellitus, endocrine disorders, and immunodeficiency states (Table 110.4).

Cutaneous lesions most directly indicative of an internal malignant disease arise from the extension of the tumor to the skin or by hematogenous or lymphatic metastasis. The neoplasms that most commonly produce cutaneous extension are lymphomas, leukemias, and carcinomas of the breast, gastrointestinal tract, lung, ovary, prostate, uterus, and bladder. Skin metastases generally signify a poor prognosis.

Pruritus may be a sign of systemic disease, such as cholestasis, renal disease, malignancy, or myeloproliferative disease.[50] Malignancies associated with pruritus include Hodgkin's disease, leukemia, adenocarcinoma or squamous cell carcinoma of various organs, carcinoid syndrome, multiple myeloma, and polycythemia vera. It may be present years before the underlying malignant disease is identified. It may be intractable and associated with urticaria, erythroderma, excoriation, or lichenification.

TABLE 110.4

Cutaneous Signs of Systemic Disease

ANATOMIC SITE	SIGN	SYSTEMIC DISEASE
Generalized	Urticaria	Drug reaction SLE Infection
	Pruritus	Anemia Renal disease Cholestasis Polycythemia Lymphoma Malignancies Thyroid disease
Head and neck	Xanthelasma	Hyperlipidemia
	Spider nevi	Liver disease Hyperthyroidism
	Malar erythema	SLE
	Photosensitive rash	SLE Porphyria
	Alopecia	Thyroid disease Drugs Anemia Malnutrition SLE Fungal infection
	Heliotrope discoloration and eyelid edema	Dermatomyositis
Hands	Gottron's papules	Dermatomyositis Internal malignancy
	Raynaud's phenomenon	Normal Connective diseases
	Clubbing	Normal Internal malignancy Cyanotic cardiac disease IBD Lung disease
	Erythema multiforme	Drugs Infections
	Palmar erythema	Normal Liver disease Pregnancy Rheumatoid arthritis SLE
Legs	Erythema nodosum	Strep infection Drugs Pregnancy Tuberculosis Sarcoidosis IBD
	Pyoderma gangrenosum	IBD Hepatitis Rheumatoid arthritis Malignancy
	Pretibial myxedema	Hypothyroidism Hyperthyroidism
	Necrobiosis lipoidica	Diabetes mellitus

IBD, Inflammatory bowel disease; *SLE,* systemic lupus erythematosus.

Purpura may be a manifestation of acute granulocytic and monocytic leukemia, myeloma, lymphoma, and polycythemia vera. Purpura is caused by vascular abnormalities, thrombocytopenia, or other coagulation defects. A variety of diseases and conditions may be the underlying cause, and the treatment should be directed toward this cause whenever possible. Thrombocytopenic

and nonthrombocytopenic forms are differentiated by the results of the patient's platelet count.

Petechiae are manifestations of intradermal hemorrhage. Petechiae may be associated with thrombocytopenia, allergic reactions, infections, trauma, or malignancy (Fig. 110.42).

MANAGEMENT

Treatments for dermatologic conditions should address both definitive treatment for underlying disease states and symptomatic treatment. If causative agents are identified, they should be discontinued or eliminated from the environment. Topical or systemic therapies may be indicated for a variety of conditions.

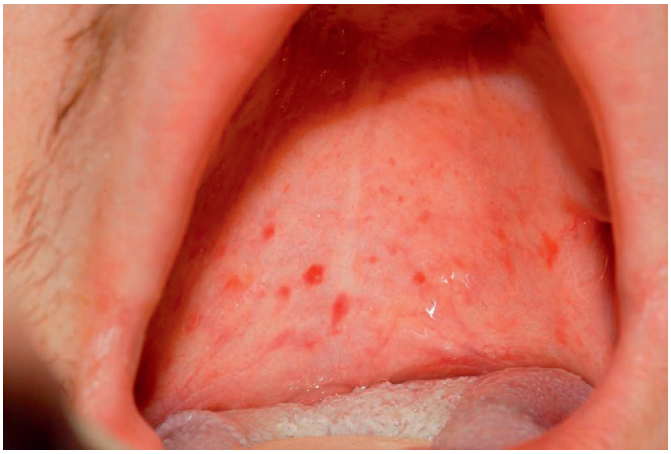

Fig. 110.42. Palatal petechiae secondary to thrombocytopenia in a patient with acute myelogenous leukemia (AML). (Courtesy Jason R. Pickett, MD.)

Vehicles for topical dermatologic preparations may be important in the therapeutic effect.[51] Vehicles include creams (water based emulsion of oil), lotions (water based suspension of powder), ointments (oil based suspension, which improves penetration of the active ingredient), gels (transparent, semi-solid, non-greasy emulsion), foams (helpful for scalp or difficult to reach areas), and pastes (ointment base with powder, stiff consistency). For dry, scaly conditions, emollients such as ointments may be more effective. For moist conditions, a dryer vehicle such as a gel or powder may be preferable. Vehicle components may vary with generic preparations, and it is important to monitor clinical success if generic preparations are prescribed. Communication with the patient about preferences may be important. Patient preference and compliance are closely linked to successful outcomes.

Topical steroids are commonly used to treat inflammatory dermatologic conditions. Topical steroids have several mechanisms of action, including antiinflammatory effects, antiproliferative effects on fibroblasts and collagen, reduction of leukocyte adhesion to capillaries, reduction of capillary wall permeability, reduction of complement components, and histamine antagonism. Adverse effects may include skin atrophy, striae, acneform lesions, pigment changes, telangiectasia, hypothalamic-pituitary axis suppression from systemic absorption, and exacerbation of certain conditions, such as fungal infections and viral infections. Topical steroids should be prescribed in the lowest potency and for the shortest duration that is effective for the individual patient (Table 110.5).

Systemic therapies are appropriate for systemic conditions. Commonly used systemic therapies include oral, IM, or IV

TABLE 110.5

Potency of Topical Steroids

BRAND NAME	GENERIC NAME
CLASS 1: SUPERPOTENT	
Clobex lotion, spray, or shampoo, 0.05%	Clobetasol propionate
Cormax cream or solution, 0.05%	Clobetasol propionate
Diprolene ointment, 0.05%	Betamethasone dipropionate
Olux E foam, 0.05%	Clobetasol propionate
Olux foam, 0.05%	Clobetasol propionate
Temovate cream, ointment, or solution, 0.05%	Clobetasol propionate
Ultravate cream or ointment, 0.05%	Halobetasol propionate
Vanos cream, 0.1%	Fluocinonide
Psorcon ointment, 0.05%	Diflorasone diacetate
Psorcon E ointment, 0.05%	Diflorasone diacetate
CLASS 2: POTENT	
Diprolene cream AF, 0.05%	Betamethasone dipropionate
Elocon ointment, 0.1%	Mometasone furoate
Florone ointment, 0.05%	Diflorasone diacetate
Halog ointment or cream, 0.1%	Halcinonide
Lidex cream, gel, or ointment, 0.05%	Fluocinonide
Psorcon cream, 0.05%	Diflorasone diacetate
Topicort cream or ointment, 0.25%	Desoximetasone
Topicort gel, 0.05%	Desoximetasone
CLASS 3: UPPER MIDSTRENGTH	
Cutivate ointment, 0.005%	Fluticasone propionate
Lidex-E cream, 0.05%	Fluocinonide
Luxiq foam, 0.12%	Betamethasone valerate
Topicort LP cream, 0.05%	Desoximetasone
CLASS 4: MIDSTRENGTH	
Cordran ointment, 0.05%	Flurandrenolide
Elocon cream, 0.1%	Mometasone furoate
Kenalog cream or spray, 0.1%	Triamcinolone acetonide
Synalar ointment, 0.03%	Fluocinolone acetonide
Westcort ointment, 0.2%	Hydrocortisone valerate
CLASS 5: LOWER MIDSTRENGTH	
Capex shampoo, 0.01%	Fluocinolone acetonide
Cordran cream, lotion, or tape, 0.05%	Flurandrenolide
Cutivate cream or lotion, 0.05%	Fluticasone propionate
Dermatop cream, 0.1%	Prednicarbate
DesOwen lotion, 0.05%	Desonide
Locoid cream, lotion, ointment, or solution, 0.1%	Hydrocortisone

Continued

TABLE 110.5

Potency of Topical Steroids—cont'd

BRAND NAME	GENERIC NAME	BRAND NAME	GENERIC NAME
Pandel cream, 0.1%	Hydrocortisone	Verdeso foam, 0.05%	Desonide
Synalar cream, 0.03%, 0.01%	Fluocinolone acetonide	**CLASS 7: LEAST POTENT**	
Westcort cream, 0.2%	Hydrocortisone valerate	Cetacort lotion, 0.5%, 1%	Hydrocortisone
CLASS 6: MILD		Cortaid cream, spray, or ointment	Hydrocortisone
Aclovate cream or ointment, 0.05%	Alclometasone dipropionate	Hytone cream or lotion, 1%, 2.5%	Hydrocortisone
Derma-Smoothe/FS oil, 0.01%	Fluocinolone acetonide	MiCort-HC cream, 2%, 2.5%	Hydrocortisone
Desonate gel, 0.05%	Desonide	Nutracort lotion, 1%, 2.5%	Hydrocortisone
Synalar cream or solution, 0.01%	Fluocinolone acetonide	Synacort cream, 1%, 2.5%	Hydrocortisone

Modified with permission from National Psoriasis Foundation: Topical steroids potency chart. Available at www.psoriasis.org/page.aspx?pid=469.

steroids, antipruritic agents, antibiotics, antifungal agents, and antiviral agents.

DISPOSITION

Most ED patients with dermatologic complaints can be successfully managed as outpatients. Indications for inpatient hospitalization include systemic disorders with dehydration, disorders of thermoregulation, systemic infection or other systemic disorder requiring inpatient management, inability to care for self, or maintain appropriate oral intake. Dermatologic outpatient follow-up or inpatient consultation may be appropriate.

KEY CONCEPTS

- Accurate descriptions of the lesion(s) are essential for accurate diagnosis and management.
- Key steps in diagnosing the unknown rash include an accurate history, physical examination, including lesions and distribution, and appropriate diagnostic tests. Bacterial infections may present as abscess, cellulitis, impetigo, or other cutaneous infections.
- Incision and drainage is adequate therapy for simple abscesses.
- Antibiotics to cover MRSA are appropriate for most skin and soft tissue infections.
- Tinea capitis requires 4 to 8 weeks of systemic antifungal treatment.
- Onychomycosis requires long-term systemic treatment.
- Allergic reactions are common. Identification and removal of exposure to the allergen, and antihistamine treatment are the cornerstones of therapy.
- Newer nonsedating antihistamines are a useful alternative to older sedating ones to control pruritus and histamine-mediated rashes while allowing the patient to remain active.
- Infestations should be diagnosed clinically and treated expeditiously even without definitive proof of the infestation.
- Medication reactions are common and may results from any medication, typically within 4 to 21 days after taking the medication.
- Rashes that are associated with mucosal lesions, blisters, or desquamating skin are often caused by significant soft tissue infections, drug eruptions, or immune disorders.
- Patients with Stevens-Johnson syndrome and toxic epidermal necrolysis require inpatient treatment, preferably in a burn unit.
- Cutaneous signs of systemic disease may include pruritus, urticaria, erythema multiforme, erythema nodosum, pyoderma gangrenosum, and others.
- Physicians should be familiar with one or two topical steroid preparations of low, medium, and high potency and their appropriate therapeutic use.
- Most patients with dermatologic conditions can be appropriately managed with outpatient treatment and follow-up with a dermatologist. Life-threatening conditions at risk for dehydration and infection require inpatient treatment.

The references for this chapter can be found online by accessing the accompanying Expert Consult website.

REFERENCES

1. Stein J: Most dermatology complaints in the emergency room are acute. Available at <www.medicalnewstoday.com/articles/283899.php>.
2. Jack AR, Spence AA, Nichols BJ, et al: Cutaneous conditions leading to dermatology consultations in the emergency department. West J Emerg Med 12(4):551–555, 2011.
3. Centers for Disease Control and Prevention (CDC): National hospital ambulatory medical care survey: 2011 emergency department summary tables. Available at <www.cdc.gov/nchs/data/ahcd/nhamcs_emergency/2011_ed_web_tables.pdf>.
4. Korting HC, Schäfer-Korting M: Carriers in the topical treatment of skin disease. Handb Exp Pharmacol 197:435–468, 2010.
5. Geria AN, Schwartz RA: Impetigo update: new challenges in the era of methicillin resistance. Cutis 85(2):65–70, 2010.
6. Stevens DL, Bisno AL, Chambers HF, et al: Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. Available at <http://cid.oxfordjournals.org/content/early/2014/06/14/cid.ciu296.full.pdf+html>.
7. Talan DA, Mower WR, Krishnadasan A, et al: Trimethoprim-sulfamethoxazole versus placebo for uncomplicated skin abscess. N Engl J Med 374(9):823–832, 2016.
8. Jemec GB: Clinical practice: Hidradenitis suppurativa. N Engl J Med 366(2):158–164, 2012.
9. Liu C, Bayer A, Cosgrove SE, et al: Clinical practice guidelines by the infectious diseases society of America for the treatment of methicillin-resistant *Staphylococcus aureus* infections in adults and children. Clin Infect Dis 52(3):285–292, 2011.
10. Miller LG, Daum RS, Creech CB, et al: Clindamycin versus trimethoprim-sulfamethoxazole for uncomplicated skin infections. N Engl J Med 372(12):1093–1103, 2015.
11. Deleted in review.
12. Deleted in review.
13. Centers for Disease Control and Prevention (CDC): Sexually transmitted diseases treatment guidelines, 2010. Available at <www.cdc.gov/std/treatment/2010/genital-ulcers.htm#a5>.
14. Patel NN, Patel DN: Staphylococcal scalded skin syndrome. Am J Med 123(6):505–507, 2010.
15. Centers for Disease Control and Prevention (CDC): Updated recommendations for use of VariZIG—United States, 2013. Available at <www.cdc.gov/mmwr/preview/mmwrhtml/mm6228a4.htm?s_cid=mm6228a4_w>.
16. Cohen JI: Herpes zoster. N Engl J Med 369(18):1766–1767, 2013.
17. Hiom S, Patel GK, Newcombe RG, et al: Severe postherpetic neuralgia and other neuropathic pain syndromes alleviated by topical gabapentin. Br J Dermatol 173(1):300–302, 2015.
18. Gan EY, Tian EA, Tey HL: Management of herpes zoster and post-herpetic neuralgia. Am J Clin Dermatol 14(2):77–85, 2013.
19. Centers for Disease Control and Prevention (CDC): Update on recommendations for use of herpes zoster vaccine. Morb Mortal Wkly Rep 63(33):729–731, 2014.
20. Barrabeig I, Rovira A, Rius C, et al: Effectiveness of measles vaccination for control of exposed children. Pediatr Infect Dis J 30(1):78–80, 2011.
21. Kaur IP, Kakkar S: Topical delivery of antifungal agents. Expert Opin Drug Deliv 7(11):1303–1327, 2010.
22. Ameen M, Lear JT, Madan V, et al: British Association of Dermatologists' guidelines for the management of onychomycosis 2014. Br J Dermatol 171(5):937–958, 2014.
23. Chouela E: Diagnosis and treatment of scabies. Am J Clinical Derm 3(1):9–18, 2002.
24. Wolf R, Davidovici B: Treatment of scabies and pediculosis: facts and controversies. Clin Dermatol 28(5):511–518, 2010.
25. Currie BJ, McCarthy JS: Permethrin and ivermectin for scabies. N Engl J Med 362(8):717–725, 2010.
26. Shmidt E, Levitt J: Dermatologic infestations. Int J Dermatol 51(2):131–141, 2012.
27. Cole SW, Lundquist LM: Spinosad for treatment of head lice infestation. Ann Pharmacother 45(7–8):954–959, 2011.
28. McCormack PL: Spinosad: in pediculosis capitis. Am J Clin Dermatol 12(5):349–353, 2011.
29. Chosidow O, Giraudeau B, Cottrell J, et al: Oral ivermectin versus malathion lotion for difficult-to-treat head lice. N Engl J Med 362(10):896–905, 2010.
30. Ameen M, Arenas R, Villanueva-Reyes J, et al: Oral ivermectin for treatment of pediculosis capitis. Pediatr Infect Dis J 29(11):991–993, 2010.
31. Pariser DM, Meinking TL, Bell M, et al: Topical 0.5% ivermectin lotion for treatment of head lice. N Engl J Med 367:1687–1693, 2012.
32. Meinking TL, Villar ME, Vicaria M, et al: The clinical trials supporting benzyl alcohol lotion 5% (Ulesfia): a safe and effective topical treatment for head lice (pediculosis humanus capitis). Pediatr Dermatol 27(1):19–24, 2010.
33. American Academy of Pediatrics: AAP offers updated guidance on treating head lice. Available at <www.aap.org/en-us/about-the-aap/aap-press-room/Pages/AAP-Offers-Updated-Guidance-on-Treating-Head-Lice.aspx>.
34. Delaunay P, Blanc V, Del Giudice P, et al: Bedbugs and infectious diseases. Clin Infect Dis 52(2):200–210, 2011.
35. Fallen RS, Gooderham M: Bedbugs: an update on recognition and management. Skin Therapy Lett 16(6):5–7, 2011.
36. Lavery MJ, Parish LC: Bed bugs revisited. Skinmed 9(1):6–8, 2011.
37. Metz M, Scholz E, Ferran M, et al: Rupatadine and its effects on symptom control, stimulation time, and temperature thresholds in patients with acquired cold urticarial. Ann Allergy Asthma Immunol 104(1):86–92, 2010.
38. Bernstein JA, Lang DM, Khan DA, et al: The diagnosis and management of acute and chronic urticaria: 2014 update. J Allergy Clin Immunol 133(5):1270–1277, 2014.
39. Fedorowicz Z, van Zuuren EJ, Hu N: Histamine H_2-receptor antagonists for urticaria. Cochrane Database Syst Rev (3):CD008596, 2012.
40. Ahmed AM, Pritchard S, Reichenberg J: A review of cutaneous drug eruptions. Clin Geriatr Med 29(2):527–545, 2013.
41. Ahronowitz I, Fox LP: Severe drug-induced dermatoses. Semin Cutan Med Surg 33(1):49–58, 2014.
42. Limsuwan T, Demoly P: Acute symptoms of drug hypersensitivity (Urticaria), angioedema, anaphylaxis, and anaphylactic shock. Med Clinics N Amer 94:691–710, 2010.
43. Stern RS: Exanthematous drug eruptions. N Engl J Med 366:2492–2501, 2012.
44. Le Cleach L, Chosidow O: Lichen planus. N Engl J Med 366:723–732, 2012.
45. Ruocco E, Wolf R, Caccavale S, et al: Bullous pemphigoid: associations and management guidelines: facts and controversies. Clin Dermatol 31(4):400–412, 2013.
46. Guy GP, Machlin SR, Ekwueme DU, et al: Prevalence and costs of skin cancer treatment in the U.S., 2002-2006 and 2007-2011. Am J Prev Med 104(4):e69–e74, 2014.
47. Council ML: Common skin cancers in older adults: approach to diagnosis and management. Clin Geriatr Med 29(2):361–372, 2013.
48. Sligh JE, Jr: New therapeutic options for actinic keratosis and basal cell carcinoma. Semin Cutan Med Surg 33(4 Suppl):S76–S80, 2014.
49. Netscher DT, Leong M, Orengo I, et al: Cutaneous malignancies: melanoma and nonmelanoma types. Plast Reconstr Surg 127(3):37e–56e, 2011.
50. Yosipovitch G, Bernhard JD: Chronic pruritus. N Engl J Med 368:1625–1634, 2013.
51. Korting HC, Schäfer-Korting M: Carriers in the topical treatment of skin disease. Handb Exp Pharmacol 197:435–468, 2010.

CHAPTER 110: QUESTIONS & ANSWERS

110.1. Which of the following statements regarding tinea capitis is TRUE?
- **A.** It is contagious.
- **B.** It is not transmitted by household pets.
- **C.** Tinea capitis presents with alopecia with normal underlying scalp.
- **D.** Topical treatment is effective.
- **E.** Treatment should be instituted for 1–2 weeks.

Answer: A. Tinea capitis is the dermatophytosis that is contagious. Systemic treatment for 4 to 6 weeks is the minimum. It may be transmitted by pets. The underlying scalp is typically inflammed.

110.2. A 16-year-old boy presents with an erythematous swelling of his left forearm. What is the appropriate initial antibiotic?
- **A.** Azithromycin
- **C.** Clindamycin
- **B.** Ceftriaxone
- **D.** Linezolid
- **E.** Penicillin VK

Answer: C. Clindamycin or trimethoprim-sulfamethoxazole are recommended first line treatment choices. Macrolides and penicillins are often ineffective against MRSA. Linezolid, although effective, is expensive and is not recommended as a first line treatment.

110.3. What is the causative organism of erythema migrans?
- **A.** *Borrelia burgdorferi*
- **B.** Group A *Streptococcus*
- **C.** Methicillin-resistant *Staphylococcus aureus*
- **D.** *Neisseria meningitides*
- **E.** Parvovirus B-19

Answer: A. Borrelia burgdorferi is the causative agent of erythema migrans, or Lyme disease. Treatment should be instituted with doxycycline for 10–21 days, or as alternates, cefuroxime, ceftriazone, or penicillin G. Group A *Streptococcus* is the causative organism of scarlet fever. *Neisseria meningitides* is the causative agent of Meningococcemia. *Parvovirus B-19* is the causative agent of erythema infectiosum.

110.4. A 26 year old man presents with an erythematous maculopapular eruption of his torso, palms, and soles. He had a painless lesion on his penis 1 month earlier. What is the treatment of choice?
A. Azithromycin
B. Benzathine penicillin G
C. Ceftriaxone
D. Doxycycline
E. Trimethoprim-sulfamethoxazole

Answer: B. Secondary syphilis is treated with benzathine penicillin G in a dose of 2.4 million units IM.

110.5. A 25 year old female presents with fever, migratory polyarthralgias, and hemorrhagic papules on her fingers and wrists. What is the best treatment?
A. Ceftriaxone
B. Ciprofloxacin
C. Doxycycline
D. Ofloxacin
E. Vancomycin

Answer: A. Treatment of disseminated gonococcal infection is with parenteral ceftriaxones, or ceftizoxime or cefotaxime. Patients allergic to β-lactam antibiotics or those with severe penicillin allergies may be treated with spectinomycin. Ciprofloxacin and ofloxacin are not recommended because of increasing resistance patterns. Hospitalization is recommended for patients with disseminated gonococcal infection.

110.6. Which of the following statements regarding gonococcal dermatitis is TRUE?
A. Gonococci can usually be seen on gram stain from the lesions.
B. It affects primarily men.
C. It occurs in 1% or 2% of patients with gonorrhea.
D. The lesions have a predilection for the knees and elbows.
E. The skin lesions are not tender.

Answer: C. Women are affected primarily. The lesions have a predilection for distal joint skin. The lesions are often multiple and have a predilection for periarticular regions of the distal extremities. The lesions begin as erythematous or hemorrhagic papules that evolve into pustules and vesicles with an erythematous halo. They may be tender and may have a gray necrotic or hemorrhagic center. The organism may be cultured from the cutaneous lesions. Gram stain only occasionally reveals the organisms.

110.7. A 30 year old man presents with headache, nausea and vomiting, myalgias, fever, and a rash of petechiae on the extremities and trunk. Lesions are clustered on the palms and soles. What is the best treatment?
A. Cephalexin.
B. Doxycycline.
C. Erythromycin.
D. Penicillin VK.
E. Trimethoprim-sulfamethoxazole.

Answer: B. Patients with Rocky Mountain Spotted Fever present with headache, nausea and vomiting, myalgias, chills, and fever. The disease may last 3 weeks and may be severe with prominent involvement of the central nervous system, cardiac, pulmonary, gastrointestinal and renal systems, disseminated intravascular coagulation, or shock. The rash begins with erythematous macules that blanch on pressure, appearing first on the wrists and ankles. These macules spread up the extremities and to the trunk and face. They may become petechial or hemorrhagic. Lesions on the palms and soles are particularly characteristic. Doxycycline is the antibiotic of choice. Chloramphenicol may be used for patients allergic to tetracyclines and in children younger than 9 years. Sulfa drugs should be avoided because they may exacerbate the illness. Rickettsiae are routinely resistant to penicillins, cephalosporins, aminoglycosides, and erythromycin.