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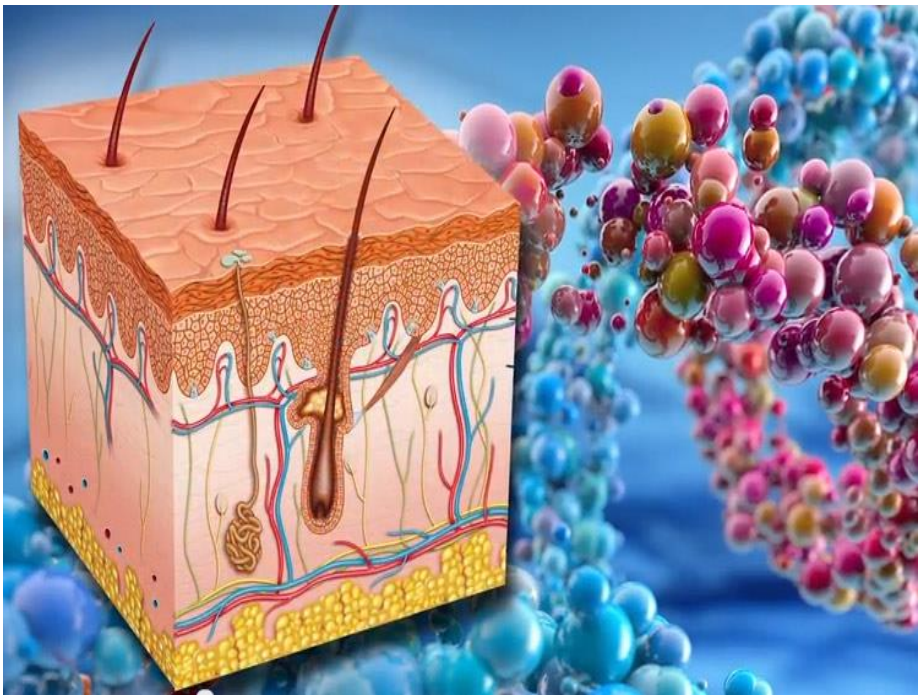
PUSTULAR SKIN DESEAES

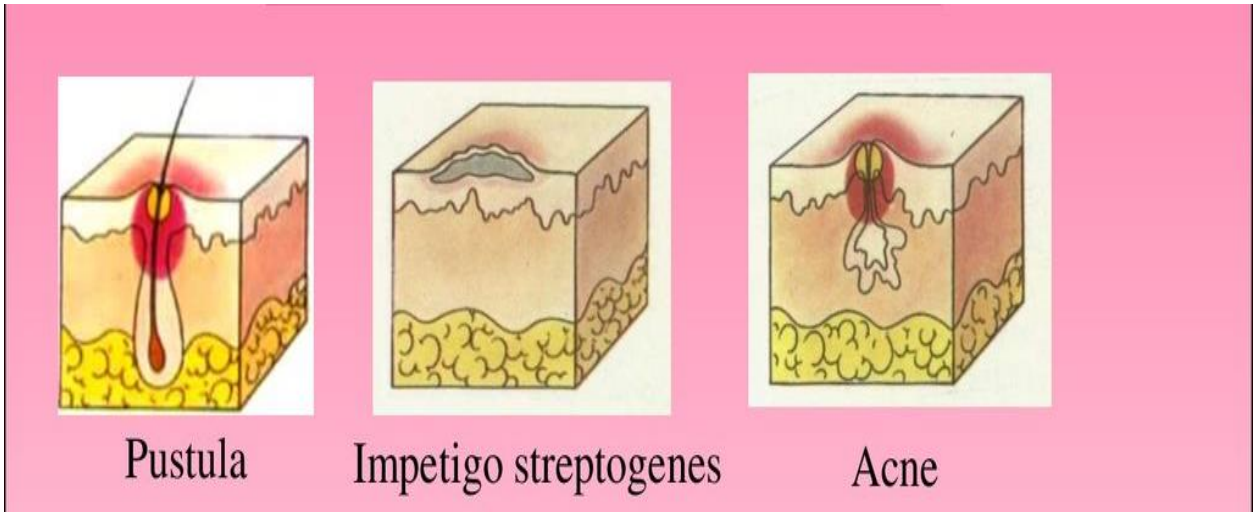


KAFOLAT TAFAKKUR
ANDIJAN – 2023 YEAR

THE MINISTRY OF HEALTH CARE OF REPUBLIC OF UZBEKISTAN
THE CENTER FOR DEVELOPMENT OF MEDICAL EDUCATION
ANDIJAN STATE MEDICAL INSTITUTE
THE DEPARTMENT OF DERMATOLOGY AND VENEREOLOGY
THE DEPARTMENT FACULTY AND HOSPITAL SURGERY

PUSTULAR SKIN DESEAES

(FOR RESIDENTS, CLINICAL INTERNS, TREATMENT AND PEDIATRICS STUDENTS)



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PUSTULAR SKIN DESEAES

Bacterial infections in the skin often have distinct morphologic characteristics that should alert the clinician to the fact that a potentially treatable and reversible condition exists. These cutaneous signs may be an indication of a generalized systemic process or simply an isolated superficial event.

Immunodeficiencies with low immunoglobulins, neutro- penia, reduced neutrophil migration or killing, and disease caused by the human immunodeficiency virus (HIV) may be associated with severe or refractory pyogenic infections. Atopic dermatitis and syndromes with atopic-like dermatitis are also predisposed to bacterial infections.

The categorization of these infections will be first those diseases caused by Gram-positive bacteria, then those caused by Gram-negative bacteria, and finally several miscellaneous diseases caused by the rickettsiae, mycoplasmas, chlamydiae, and spirochetes.

INFECTIONS CAUSED BY GRAM-POSITIVE ORGANISMS

Staphylococcal infections

The skin lesions induced by this Gram-positive coccus appear usually as pustules, furuncles, or erosions with honey-colored crusts; however, bullae, widespread erythema and desquama- tion, or vegetating pyodermas may also be indicators of *Staphylococcus aureus* infection. Purulent purpura may indicate bacteremia or endocarditis caused by *S. aureus,* or, in immunocompromised patients, *S. epidermidis.* Two distinctive cutaneous lesions that occur with endocarditis are the Osler node and Janeway lesion or spot. The former is a painful, erythematous nodule with a pale center located on the fingertips. The latter is a nontender, angular hemorrhagic lesion of the palms (Fig. 1) and soles. These lesions are likely to be due to septic emboli.

S. aureus is a normal inhabitant of the anterior nares in 2040% of adults, and also resides on the hands and perineum in smaller numbers of individuals. Nasal

carriers are particularly prone to infections with this bacterium because of its continuous presence on the skin and nasal mucosa. Spread of infection in the hospital setting is frequently traced to the hands of a healthcare worker. Proper handwashing technique is essential in limiting this nosocomial complication. HIV-infected patients are at least twice as commonly nasal carriers, and they tend to harbor *S. aureus* in higher frequency and density at other sites of the body, thus predisposing them to skin and systemic infection.

Antibiotic resistance has become a clinically important consideration in many infections, but meticillin-resistant *S. aureus* (MRSA), which has been a nosocomial problem for years, is now a common community-acquired skin infection. MRSA infection may be suspected from a knowledge of local patterns of resistance, lack of response to initial meticillin-sensitive *S. aureus* (MSSA)-directed therapy, such as cefalexin, and factors predisposing to colonization and infection with this organism. Predisposing factors include age (older than 65), exposure to others with MRSA infection, prior antibiotic therapy, and recent hospitalization or chronic illness. In patients with risk factors, multiple drug resistance is likely and treatment with intravenous vancomycin or linezolid may be necessary. In community-acquired infection in patients without risk factors, clindamycin, trimethoprim-sulfamethoxazole (alone or combined with rifampin), minocycline, or oral linezolid will often be effective. Definitive antibiotic therapy may be tailored to the antibiotic susceptibility of the cultured organism.

Superficial pustular folliculitis (impetigo of Bockhart)

Bockhart impetigo is a superficial folliculitis with thin-walled pustules at the follicle orifices. Favorite locations are the extremities and scalp, although it is also seen on the face, especially periorally. These fragile, yellowish-white, domed pustules develop in crops and heal in a few days. *S. aureus* is the most frequent cause. The infection may secondarily arise in scratches, insect bites, or other skin injuries.

Sycosis vulgaris (sycosis barbae)

Sycosis vulgaris, formerly known as barber's itch, is a perifol- licular, chronic, pustular staphylococcal infection of the bearded region (Fig. 2), characterized by the presence of inflammatory papules and pustules, and a tendency to recurrence. The disease begins with erythema and burning or itching, usually on the upper lip near the nose. In a day or two one or more pinhead-sized pustules, pierced by hairs, develop.

These rupture after shaving or washing and leave an erythematous spot, which is later the site of a fresh crop of pustules. In this manner the infection persists and gradually spreads. At times the infection may extend deep into the follicles. A hairless, atrophic scar bordered by pustules and crusts may result. Marginal blepharitis with conjunctivitis is usually present in severe cases of sycosis.

Sycosis vulgaris is to be distinguished from tinea, acne vulgaris, pseudofolliculitis barbae, and herpetic sycosis. Tinea barbae rarely affects the upper lip, which is a common location for sycosis. In tinea barbae the involvement is usually in the submaxillary region or on the chin, and spores and hyphae are found in the hairs. Pseudofolliculitis barbae manifests torpid papules at the sites of ingrowing beard hairs in black men. In herpes simplex the duration is usually only a few days and even in persistent cases there are vesicles, which help vulgaris.

Folliculitis

Staphylococcal folliculitis may affect other areas, such as the eyelashes, axillae, pubis, and thighs (Fig. 3). On the pubis it may be transmitted among sexual partners, and mini- epidemics of folliculitis and furunculosis of the genital and gluteal areas may be considered a sexually transmitted disease (STD). Staphylococcal folliculitis has also been reported frequently among patients with acquired immunodeficiency syndrome (AIDS) and may be a cause of pruritus. An atypical, plaque-like form has been reported.

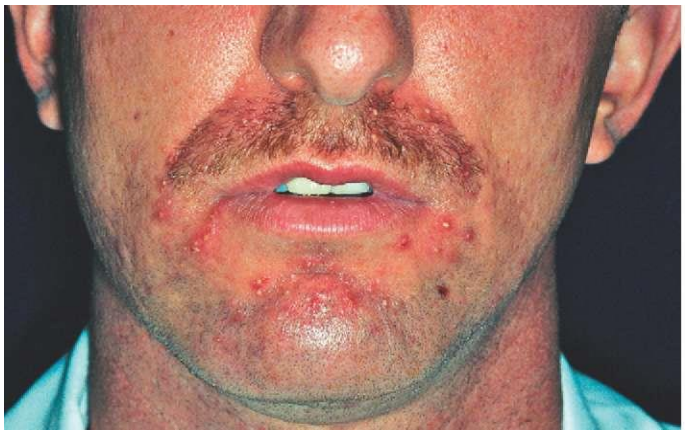


Fig. 2 Sycosis barbae

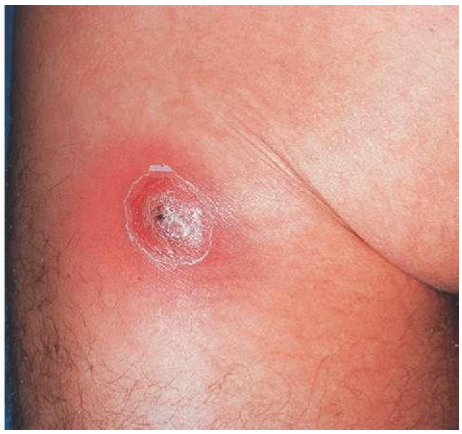
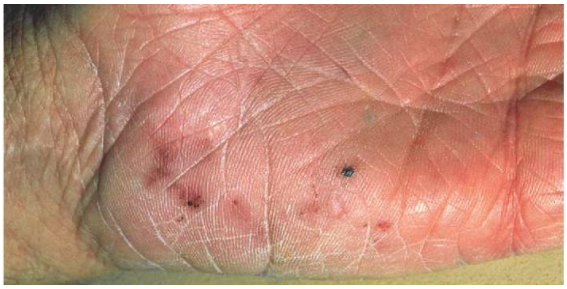


Fig. 3 Staphylococcal abscess



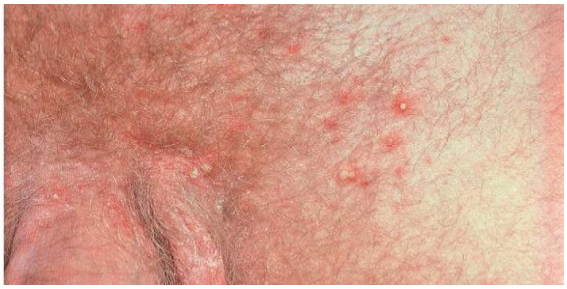


Fig. 1 Janeway lesion in subacute bacterial **Fig. 4** Staphylococcal folliculitis

Treatment

Deep lesions of folliculitis represent small follicular abscesses and must be drained. Superficial pustules will rupture and drain spontaneously. Many patients will heal with drainage and topical therapy. Bactroban or retapamulin ointment and topical cleocin solution are effective topical agents. Skin surface staphylococcal carriage in abrasions and eczematous areas may be addressed with topical antibiotics as above, topical chlorhexidine, or bleach baths. The latter can be prepared by adding one half-cup of Clorox bleach to a tub of bathwater. If drainage and topical therapy fail or if there is accompanying soft-tissue infection, a first-generation cephalo- sporin, or a penicillinase-resistant penicillin such as dicloxacil- lin, is indicated, unless MRSA is suspected (see above). When the inflammation is acute, hot, wet soaks with Burow solution diluted 1 : 20 (Domeboro) are beneficial. An anhydrous formulation of aluminum chloride (Drysol, Xerac-AC) is effective when used once a

night for chronic folliculitis, especially of the buttocks. Antibiotic ophthalmic ointments are used for blepharitis.

Furunculosis

A furuncle, or boil, is an acute, round, tender, circumscribed, perifollicular staphylococcal abscess that generally ends in central suppuration (Fig. 4). A carbuncle is merely two or more confluent furuncles, with separate heads.

The lesions begin in hair follicles, and often continue for a prolonged period by autoinoculation. Some lesions disappear before rupture, but most undergo central necrosis and rupture through the skin, discharging purulent, necrotic debris. Sites of predilection are the nape, axillae, and buttocks, but boils may occur anywhere.

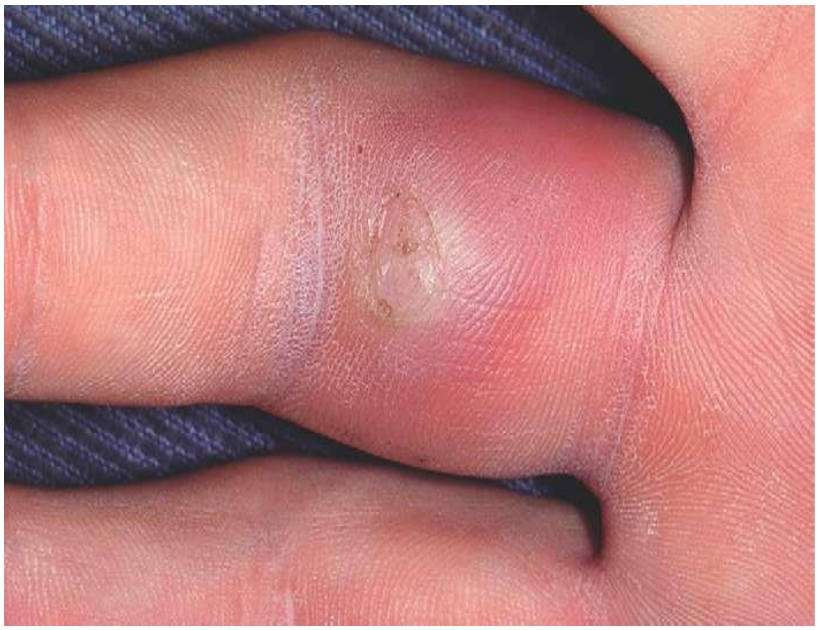


Fig. 5 Staphylococcal abscess in a diabetic patient.

The integrity of the skin surface may be impaired by irritation, pressure, friction, hyperhidrosis, dermatitis, dermato- phytosis, or shaving, among other factors. Local barrier compromise predisposes to infection by providing a portal of entry for the ubiquitous *S. aureus.* The proximate cause is either contagion or autoinoculation from a carrier focus, usually in the nose or groin.

Certain systemic disorders may predispose to furunculosis: alcoholism; malnutrition; blood dyscrasias; disorders of neu- trophil function; iatrogenic or other

immunosuppression, including AIDS; and diabetes (Fig. 5). Patients with several of these diseases, as well as those receiving renal dialysis or under treatment with isotretinoin or acitretin, are often nasal carriers of *S. aureus.* Additionally, atopic dermatitis also predisposes to the *S. aureus* carrier state. This fact helps explain the observed increases in the incidence of infections in these diseases.

Hospital furunculosis

Epidemics of staphylococcal infections occur in hospitals. Marked resistance to antibacterial agents in these cases is commonplace. Attempts to control these outbreaks center on meticulous handwashing. In nurseries, a fall in neonatal colonization and infections with *S. aureus* and non-group A streptococci may be achieved by using a 4% solution of chlorhexidine for skin and umbilical cord care.

Treatment

Warm compresses and antibiotics taken internally may arrest early furuncles. A penicillinase-resistant penicillin or a first- generation cephalosporin should be given orally in a dose of 1-2 g/day according to the severity of the case. Meticillin-resistant and even vancomycin-resistant strains occur, as described above. In cases of staphylococcal infections that are unresponsive to these usual measures, antibiotic-resistant strains should be suspected and sensitivities checked. Bactroban applied to the anterior nares daily for 5 days and bleach baths may help prevent recurrence.

When the lesions are incipient and acutely inflamed, incision should be strictly avoided and moist heat employed. When the furuncle has become localized and shows definite fluctuation, incision with drainage is indicated. The cavity should be packed with iodoform or vaseline gauze. In these cases, oral antibiotics are not usually necessary.

In boils of the external auditory canal, upper lip, and nose, incision and drainage is generally only performed if antibiotic therapy fails. In these latter circumstances, antibiotic ointment (Bactroban) should be applied, and antibiotics given internally. Warm saline-solution compresses should be applied liberally.

Chronic furunculosis

Despite treatment, recurrences of some boils may be anticipated. Usually no underlying disease is present to predispose to this; rather, autoinoculation and intrafamilial spread among colonized individuals are responsible.

One of the most important factors in prevention is to avoid autoinoculation. It is important to emphasize that the nasal carrier state predisposes to chronic furunculosis. The skin surface in the region of the furuncles may be a source of colonization, especially if there are cuts, excoriation, or eczematous changes. In addition, the hazard of contamination from the perianal and intertriginous areas is to be considered. In general, indications for elimination of the carriage state are recurrent infection, evidence of spread to others, or highrisk individuals in the household.

Routine precautions to be taken in attempting to break the cycle of recurrent furunculosis should be the daily use of a chlorhexidine wash, with special attention to the axillae, groin, and perianal area; laundering of bedding and clothing on a daily basis initially; the use of bleach baths; and frequent hand- washing. Additionally, the application of Bactroban ointment twice a day to the nares of patients and family members every fourth week has been found to be effective. Rifampin, 600 mg/ day, combined with dicloxacillin for MSSA or trimethoprim- sulfamethoxazole for MRSA, for 10 days, or low-dose (150 mg/ day) clindamycin for 3 months are other options that are effective in eradicating the nasal carriage state. The use of bacitracin ointment inside the nares twice a day throughout the course of isotretinoin therapy eliminates, or markedly reduces, the risk of inducing nasal carriage of *S. aureus,* and hence staphylococcal infections.

Pyogenic paronychia

Paronychia is an inflammatory reaction involving the folds of the skin surrounding the fingernail. It is characterized by acute or chronic purulent, tender, and painful swellings of the tissues around the nail, caused by an abscess in the nailfold. When the infection becomes chronic, horizontal ridges appear at the base of the nail. With recurrent bouts new ridges appear.

The primary predisposing factor that is identifiable is separation of the eponychium from the nail plate. The separation is usually caused by trauma as a result of moisture-induced maceration of the nailfolds from frequent wetting of the hands. The relationship is close enough to justify treating chronic paronychia as work-related in bartenders, food servers, nurses, and others who often wet their hands. The moist grooves of the nail and nailfold become secondarily invaded by pyogenic cocci and yeasts. The causative bacteria are usually *S. aureus*, *Streptococcus pyogenes*, *Pseudomonas* species, *Proteus* species, or anaerobes. The pathogenic yeast is most frequently *Candida albicans.*

The bacteria usually cause acute abscess formation *(Staphylococcus)* (Fig. 6) or erythema and swelling *(Streptococcus)* (Fig. 7), and *C. albicans* most frequently causes a chronic swelling. If an abscess is suspected, applying light pressure with the index finger against the distal volar aspect of the affected digit will better demonstrate the extent of the collected pus by inducing a well-demarcated blanching. Smears of purulent material will help confirm the clinical impression. Myremecial warts may at times mimic paronychia.

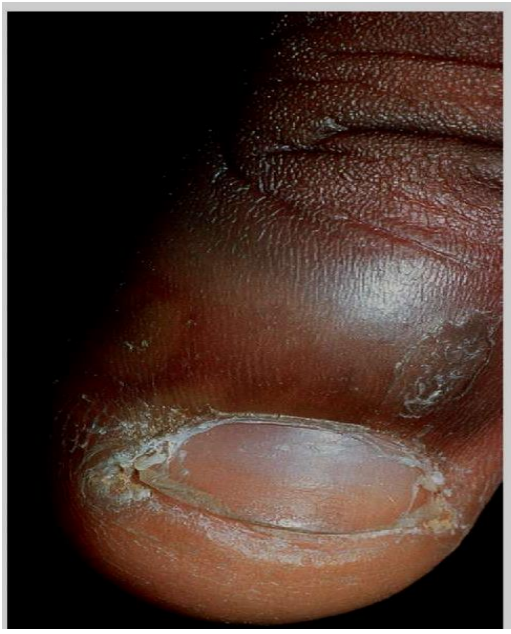


Fig. 6 Staphylococcal paronychia.

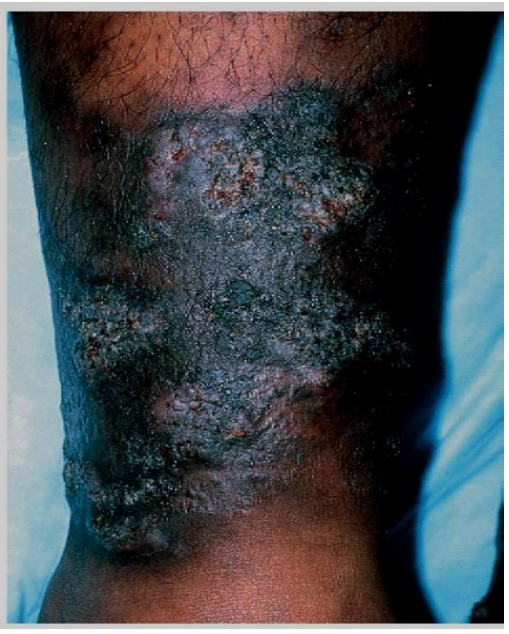


Fig. 8 Botryomycjsis

Subungual black macules followed by edema, pain, and swelling have been reported to be a sign of osteomyelitis caused by *S. aureus* or *Streptococcus viridans*,

in children with atopic dermatitis. Treatment of pyogenic paronychia consists mostly of protection against trauma and concentrated efforts to keep the affected fingernails meticulously dry. Rubber or plastic gloves over cotton gloves should be used whenever the hand must be placed in water. Acutely inflamed pyogenic abscesses should be incised and drained. The abscess may often be opened by pushing the nailfold away from the nail plate. In acute suppurative paronychia, especially if stains show pyo- genic cocci, a semisynthetic penicillin or a cephalosporin with excellent staphylococcal activity should be given orally. If these are ineffective, MRSA or a mixed anaerobic bacteria infection should be suspected. Augmentin for the latter or treatment dictated by the sensitivities of the cultured organism will improve cure rates. Rarely, long-term antibiotic therapy may be required.

While *Candida* is the most frequently recovered organism in chronic paronychia, topical or oral antifungals lead to cure in only about 50% of cases. If topical steroids are used to decrease inflammation and allow for tissue repair, cure results more reliably (nearly 80% in one study). Often an antifungal liquid such as miconazole is combined with a topical corticosteroid cream or ointment.

Botryomycosis

Botryomycosis is an uncommon, chronic, indolent disorder characterized by nodular, crusted, purulent lesions (Fig. 8). Sinuses that discharge sulfur granules are present. These heal with atrophic scars. The granules most commonly yield *S. aureus* on culture, although cases caused by *Pseudomonas aeruginosa*, *Escherichia coli*, *Proteus, Bacteroides,* and *Streptococcus* have been reported. Botryomycosis occurs frequently in patients with altered immune function, such as those with neutrophilic defects. Other predisposing factors include diabetes, HIV infection, alcoholism, and Job syndrome. Appropriate antibiotics, surgical drainage, and surgical excision are methods used to treat botryomycosis.

Blastomycosis-like pyoderma

Large verrucous plaques with elevated borders and multiple pustules occur. Most patients have some underlying systemic or local host compromise. Bacteria such as *S. aureus, P. aerugi- nosa, Proteus, E. coli,* or streptococci may be isolated. Antibiotics appropriate for the organism isolated are curative; however, response may be delayed and prolonged therapy required. Acitretin may also be useful.

Pyomyositis

S. aureus abscess formation within the deep, large, striated muscles usually presents with fever and muscle pain. It is more common in the tropics, where it may affect adults but most commonly occurs in children. In temperate climates it occurs in children and patients with AIDS. The most frequent site in tropical disease is the thigh, while in HIV-infected patients the deltoid muscle is most often involved, followed closely by the quadriceps. Swelling and, occasionally, erythema or yellow or purplish discoloration are visible signs of pyomyositis, but these are late findings. Magnetic resonance imaging (MRI) with gadolinium injection will help delineate the extent of disease. Drainage of the abscess and appropriate systemic antibiotics are the recommended treatment.

Impetigo contagiosa

Impetigo contagiosa is a staphylococcal, streptococcal, or combined infection characterized by discrete, thin-walled vesicles that rapidly become pustular and then rupture. Impetigo occurs most frequently on the exposed parts of the body: the face (Fig. 9), hands, neck, and extremities. Impetigo on the scalp is a frequent complication of pediculosis capitis.

The disease begins with 2 mm erythematous macules, which may shortly develop into vesicles or bullae. As soon as these lesions rupture, a thin, straw-colored, seropurulent discharge is noted. The exudate dries to form loosely stratified golden- yellow crusts, which accumulate layer upon layer until they are thick and friable.

The crusts can usually be removed readily, leaving a smooth, red, moist surface that soon collects droplets of fresh exudate again; these are spread to other

parts of the body by fingers or towels. As the lesions spread peripherally and the skin clears centrally, large circles are formed by fusion of the spreading lesions to produce gyrate patterns.

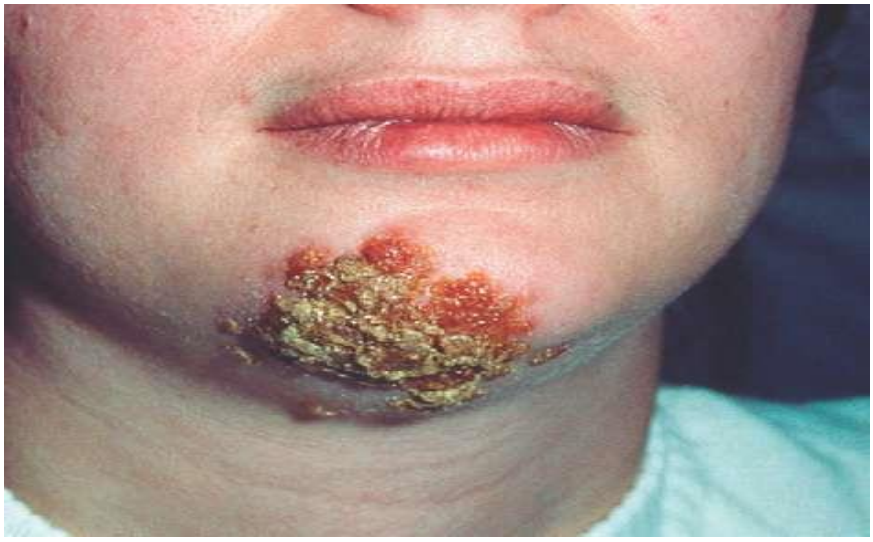


Fig. 9 Impetigo.

In streptococcal-induced impetigo, regional lymphadenopathy is common, but not serious.

Most studies find 50-70% of cases are due to *S. aureus*, with the remainder being due to either *S. pyogenes* or a combination of these two organisms. Streptococci may represent an early pathogen in the pathogenesis of impetigo, with staphylococci replacing streptococci as the lesion matures. Group B streptococci are associated with newborn impetigo and groups C and G are rarely isolated from impetigo, as opposed to the usual group A.

Impetigo occurs most frequently in early childhood (Fig. 10), although all ages may be affected. It occurs in the temperate zone, mostly during the summer in hot, humid weather. Common sources of infection for children are pets, dirty fingernails, and other children in schools, daycare centers, or crowded housing areas; for adults, common sources include infected children and self-inoculation from nasal or perineal carriage. Impetigo often complicates pediculosis capitis, scabies, herpes simplex,

insect bites, poison ivy, eczema, and other exudative, pustular, or itching skin diseases.

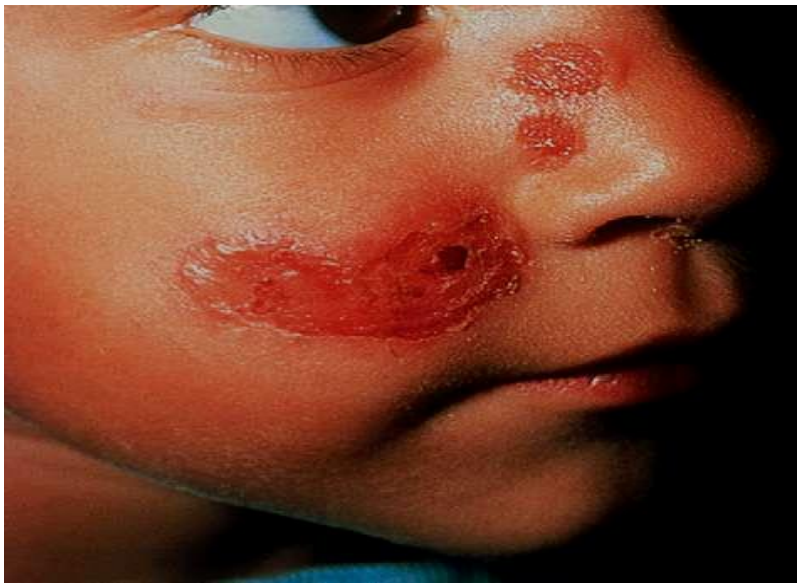


Fig. 10 Impetigo.

Group A P-hemolytic streptococcal skin infections are sometimes followed by acute glomerulonephritis (AGN). Nephritogenic streptococci are generally associated with impetigo rather than with upper respiratory infections. There is no evidence that AGN occurs with staphylococcal impetigo. The important factor predisposing to AGN is the serotype of the streptococcus producing the impetigo. Type 49, 55, 57, and 60 strains and strain M-type 2 are related to nephritis.

The incidence of AGN with impetigo varies from about 2% to 5% (10-15% with nephritogenic strains of streptococcus) and occurs most frequently in childhood, generally under the age of 6. The prognosis in children is mostly excellent; however, in adults the prognosis is not as good. Treatment, however early and however appropriate, is not believed to reduce the risk of occurrence of AGN.

The histopathology is that of an extremely superficial inflammation about the funnel-shaped upper portion of the pilo- sebaceous follicles. A subcorneal vesicopustule is formed, containing a few scattered cocci, together with debris of poly- morphonuclear leukocytes and epidermal cells. In the dermis there is a mild inflammatory reaction-vascular dilation, edema, and infiltration of polymorphonuclear leukocytes.

Impetigo may simulate several diseases. The circinate patches are frequently mistaken for ringworm, but clinically are quite different. Impetigo is characterized by superficial, very weepy lesions covered by thick, bright yellow or orange crusts with loose edges, which do not resemble the scaling patches with peripheral erythema seen in tinea.

Impetigo may be mistaken for *Toxicodendron* dermatitis, but it is more crusted and pustular, and more liable to involve the nostrils, corners of the mouth, and ears; it is not associated with the puffing of the eyelids, the linear lesions, or the itchiness that are so often present in dermatitis caused by poison ivy or oak. In varicella the lesions are small, widely distributed, discrete, umbilicated vesicles that are usually also present in the mouth, a site not involved by impetigo. In ecthyma the lesions are crusted ulcers, not erosions.

Treatment

Systemic antibiotics combined with topical therapy are advised. Because most cases are caused by *Staphylococcus*, a semisynthetic penicillin or a first-generation cephalosporin is recommended, unless MRSA is suspected, as detailed above. All treatment should be given for 7 days. It is necessary to soak off the crusts frequently, after which an antibacterial ointment should be applied. If the lesions are localized, especially if facial, and are present in an otherwise healthy child, topical therapy may be effective as the sole treatment.

Applying antibiotic ointment as a prophylactic to sites of skin trauma will prevent impetigo in high-risk children attending daycare centers. In one study infections were reduced by 47% with antibiotic ointment compared with 15% with a placebo. Additionally, if recurrent staphylococcal impetigo develops, a culture of the anterior nares may yield this organism. Such carrier states may be treated by application of mupi- rocin ointment to the anterior nares twice a day or a 10-day course of rifampin, 600 mg/day combined with dicloxacillin (for MSSA) or trimethoprim-sulfamethoxazole (for MRSA).

Bullous impetigo

This variety of impetigo occurs characteristically in newborn infants, though it may occur at any age. The neonatal type is highly contagious and is a threat in nurseries. In most cases the disease begins between the fourth and tenth days of life with the appearance of bullae, which may appear on any part of the body. Common early sites are the face and hands. Constitutional symptoms are at first absent, but later weakness and fever or a subnormal temperature may be present. Diarrhea with green stools frequently occurs. Bacteremia, pneumonia, or meningitis may develop rapidly, with fatal termination.

In warm climates particularly, adults may have bullous impetigo (Fig. 11), most often in the axillae or groins, or on the hands. Usually no scalp lesions are present. The lesions are strikingly large, fragile bullae, suggestive of pemphigus. When these rupture they leave circinate, weepy, or crusted lesions, and in this stage it may be called impetigo circinata. Children with bullous impetigo may give a history of an insect bite at the site of onset of lesions. The majority are caused by phage types 71 or 55 coagulase-positive *S. aureus* or a related group 2 phage type. Bullous impetigo may be an early manifestation of HIV infection.

Staphylococcal scalded skin syndrome

Staphylococcal scalded skin syndrome (SSSS) is a generalized, confluent, superficially exfoliative disease, occurring most commonly in neonates and young children. It was known in the past as Ritter's disease or dermatitis exfoliativa neonato- rum. It has been reported to occur rarely in adults. When it does occur in an adult, usually either renal compromise or immunosuppression is a predisposing factor.

SSSS is a febrile, rapidly evolving, generalized, desquama- tive infectious disease, in which the skin exfoliates in sheets. It does not separate at the dermoepidermal junction, as in toxic (drug-induced) epidermal necrolysis (TEN), but within the granular layer. The lesions are thus much more superficial and less severe than in TEN, and healing is much more rapid. They also extend far beyond areas of

actual staphylococcal infection, by action of the exfoliative exotoxins types A and B elaborated by the staphylococcus in remote sites. Usually the staphylo- cocci are present at a distant focus, such as the pharynx, nose, ear, or conjunctiva. Septicemia or a cutaneous infection may also be the causative focus.

Its clinical manifestations begin abruptly with fever, skin tenderness, and erythema involving the neck, groins, and axillae (Fig. 12). There is sparing of the palms, soles, and mucous membranes. Nikolsky sign is positive. Generalized exfoliation follows within the next hours to days, with large sheets of epidermis separating.

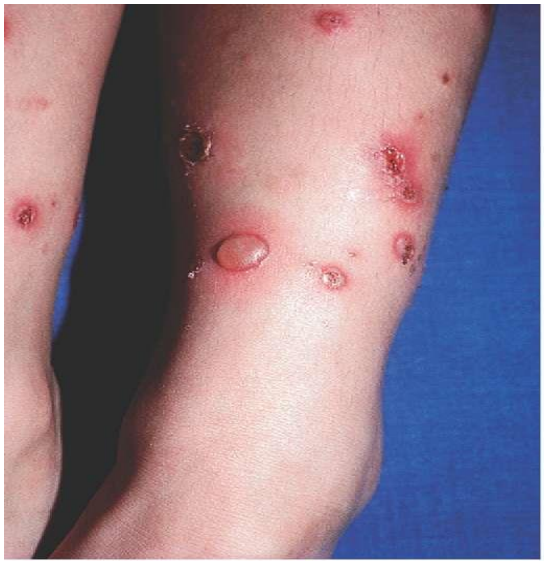


Fig. 11. Bulleus impetigo

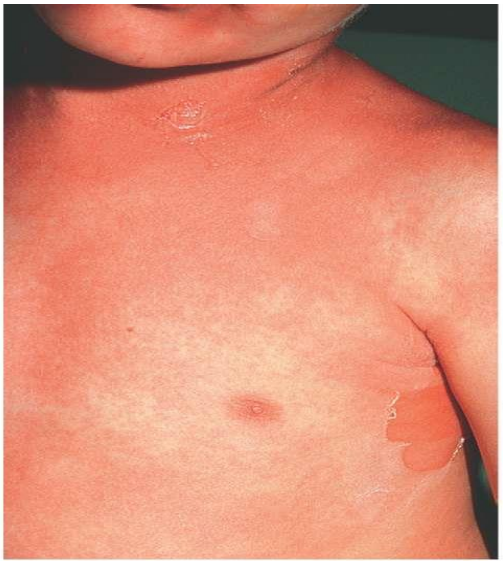


Fig. 12. Staphylococcal skin syndrome

Group 2 *S. aureus*, most commonly phage types 71 or 55, is the causative agent in most cases. If cultures are taken, they should be obtained from the mucous membranes because the skin erythema and desquamation are due to the distant effects of the exfoliative toxins, unlike the situation in bullous impetigo, where *S. aureus* is present in the lesions.

Rapid diagnosis can be made by examining frozen sections of a blister roof and observing that the full thickness of the epidermis is not necrotic as in TEN but rather is cleaved below the granular layer. The exfoliative toxins A, B, and D specifically cleave desmoglein 1, the antigenic target of autoantibod- ies in pemphigus foliaceus,

thus accounting for the clinical and histologic similarity to pemphigus observed in SSSS and bullous impetigo.

Treatment of choice is a penicillinase- resistant penicillin such as dicloxacillin combined with fluid therapy and general supportive measures. If MRSA is cultured, and response is sluggish, antibiotics directed according to the susceptibilities of the recovered organism are needed. The prognosis is good in children; however, the mortality rate in adults can reach 60%.

Gram-positive toxic shock syndromes

Toxic shock syndrome (TSS) is an acute, febrile, multisystem illness, having as one of its major diagnostic criteria a widespread macular erythematous eruption. It is usually caused by toxin-producing strains of *S. aureus*, most of which were initially isolated from the cervical mucosa in menstruating young women. Now cases are most often due to infections in wounds, catheters, contraceptive diaphragms, or nasal packing. The mortality of these nonmenstrual cases is higher (up to 20%) compared with menstrual-related cases (under 5%), probably as a result of delayed diagnoses. Additionally, a very similar syndrome has been defined in which the cause is group A, or rarely group B, streptococci. This latter multiorgan disease has systemic components similar to classic staphylococcal TSS; however, the infection is usually a rapidly progressive, destructive soft-tissue infection such as necrotizing fasciitis. Those with an underlying chronic illness, recently recovered from varicella, or using nonsteroidal anti-inflammatory agents are predisposed. It has a case fatality rate of 30%. The streptococci are usually of M-types 1 and 3, with 80% of the isolates producing pyrogenic exotoxin A.

The Center for Communicable Diseases (CDC) case definition of staphylococcal TSS includes the following: a temperature of 38.9°C or higher, an erythematous eruption, desquamation of the palms and soles 1-2 weeks after onset (Fig. 13), hypotension, and involvement of three or more other systems — gastrointestinal (vomiting, diarrhea), muscular (myalgias, increased creatinine phosphokinase level), mucous membrane (hyperemia), renal (pyuria without infec-

tion or raised creatinine or blood urea nitrogen levels), hepatic (increased bilirubin, SGOT, or SGPT), hematologic (platelets <100 000/mm^3), or central nervous system (CNS) (disorienta- tion). In addition, serologic tests for Rocky Mountain spotted fever, leptospirosis, and rubeola, and cultures of blood, urine, and cerebrospinal fluid should be negative. Procalcitonin, an indicator of severe bacterial infection may be a biologic marker for the toxic shock syndromes. Bulbar conjunctival hyperemia and palmar edema are two additional clinical clues. Streptococcal TSS is defined by isolation of group A P-hemolytic streptococci, hypotension, and two or more of the following: renal impairment, coagulopathy, hepatic involvement, acute respiratory distress syndrome, a generalized erythematous macular eruption that may desquamate, and soft tissue necrosis, myositis, or gangrene.

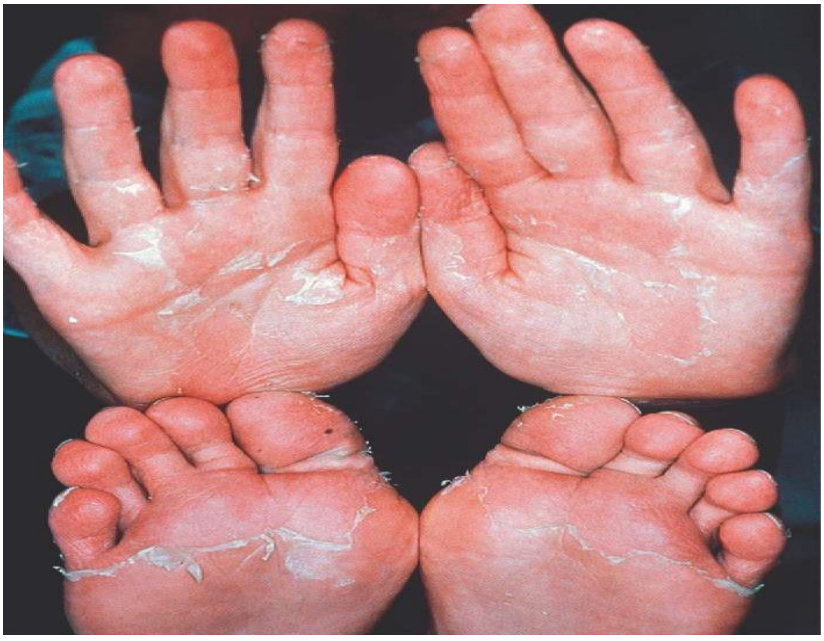


Fig. 13 Desquamation of the palms and soles.

Around 90% of the early cases occurred in young women between the first and sixth days of a menstrual period. During the initial outbreak, the majority were using a superabsorbent tampon. Cases occur in women using contraceptive sponges, in patients with nasal packing after rhinoplasty, and in patients with staphylococcal infections of bone, lung, or soft tissue. The offending *S. aureus* strain produces one or more exotoxins. Histologic findings are spongiosis and neutrophils scattered throughout the epidermis, individual necrotic keratinocytes, perivascular and

interstitial infiltrates composed of lymphocytes and neutrophils, and edema of the papillary dermis. TSS must be differentiated from viral exanthems, Kawasaki's disease, scarlet fever, recurrent toxin-mediated perianal erythema, drug eruptions, Rocky Mountain spotted fever, systemic lupus erythematosus, TEN, and SSSS. In Kawasaki's disease, TSS toxin-producing staphylococcus has been recovered and streptococci that produce pyrogenic exotoxin B and C may be isolated; thus, some feel Kawasaki's disease is caused by toxin-secreting bacteria. Treatment consists of systemic antibiotics such as nafcillin, 1-1.5 g intravenously every 4 h, vigorous fluid therapy to treat shock, and drainage of the *S. aureus*-infected site.

Streptococcal skin infections Ecthyma

Ecthyma is an ulcerative staphylococcal or streptococcal pyo- derma, nearly always of the shins or dorsal feet. The disease begins with a vesicle or vesicopustule, which enlarges and in a few days becomes thickly crusted. When the crust is removed there is a superficial saucer-shaped ulcer with a raw base and elevated edges (Fig. 14). In urban areas these lesions are due to *S. aureus* and are seen in intravenous drug users and HIV-infected patients.

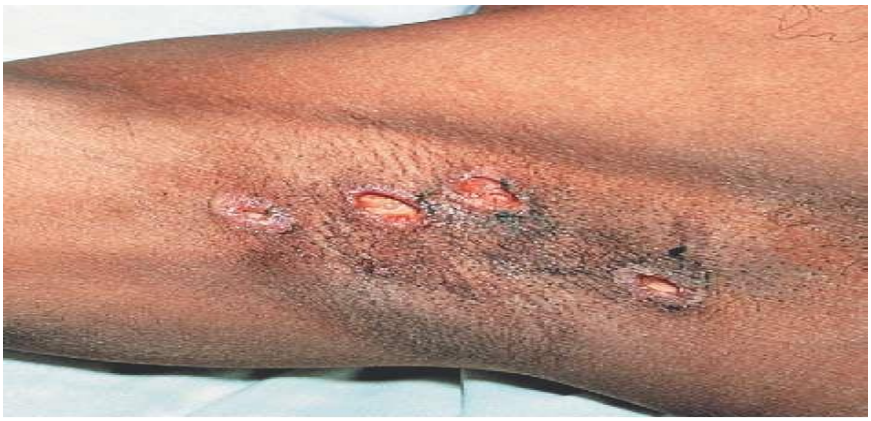


Fig. 14 Ecthyma.

The lesions tend to heal after a few weeks, leaving scars, but rarely may proceed to gangrene when resistance is low. In fact, in a debilitated patient a focus of pyogenic infection elsewhere often precedes the onset of ecthyma in many cases.

Local adenopathy may be present. Uncleanliness, malnutrition, and trauma are predisposing causes.

Treatment is cleansing with soap and water, followed by the application of mupirocin, retapamulin, or bacitracin ointment, twice a day. Oral dicloxacillin or a first-generation cephalo- sporin is also indicated, with adjustments made according to the cultured organism's susceptibilities.

Scarlet fever

Scarlet fever is a diffuse erythematous exanthem that occurs during the course of streptococcal pharyngitis. It affects primarily children, who develop the eruption 24-48 h after the onset of pharyngeal symptoms. The tonsils are red, edema- tous, and covered with exudate. The tongue has a white coating through which reddened, hypertrophied papillae project, giving the so-called white strawberry tongue appear- ance. By the fourth or fifth day the coating disappears, the tongue is bright red, and the red strawberry tongue remains.

The cutaneous eruption begins on the neck, then spreads to the trunk (Fig. 14-15) and finally the extremities. Within the widespread erythema are 1-2 mm papules, which give the skin a rough sandpaper quality.

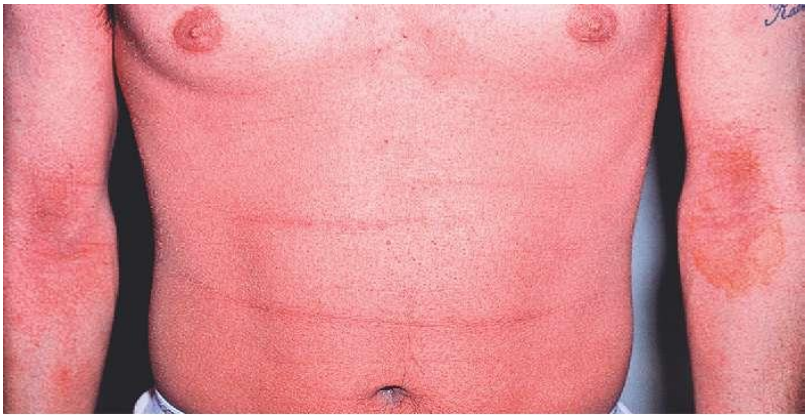


Fig. 15 Scarlet fever.

There is accentuation over the skinfolds, and a linear petechial eruption, called Pastia lines, is often present in the antecubital and axillary folds. There is facial flushing and circumoral pallor. A branny desquamation occurs as the eruption fades,

with peeling of the palms and soles taking place about 2 weeks after the acute illness. The latter may be the only evidence that the disease has occurred.

The eruption is produced by erythrogenic exotoxin- producing group A streptococci. Cultures of the pharynx will recover this organism. Rarely, scarlet fever may be related to a surgical wound or burn infection with streptococci. An elevated antistreptolysin O titer may provide evidence of recent infection if cultures are not taken early. A condition known as staphylococcal scarlatina has been described that mimics scarlet fever; however, the strawberry tongue is not seen.

Penicillin, erythromycin, or dicloxacillin treatment is curative, and the prognosis is excellent.

Recurrent toxin-mediated perianal erythema

This recently described condition manifests as a perineal erysipelas-like erythema that resolves with desquamation. Strawberry tongue, erythema of the hands with desquamation, and a mild fever 1 or 2 days before the eruption are other signs. In some patients, a staphylococcal or streptococcal pharyngitis, impetigo, or perianal streptococcal dermatitis is present. There may be recurrences in individual patients. Streptococcal pyrogenic exotoxins A and B or toxic shock syndrome toxin 1 may be responsible for the skin findings.

Erysipelas

Also once known as St Anthony's fire and ignis sacer, erysipelas is an acute P-hemolytic group A streptococcal infection of the skin involving the superficial dermal lymphatics. Occasional cases caused by streptococci of group C or G are reported in adults. Group B streptococcus is often responsible in the newborn and may be the cause of abdominal or perineal erysipelas in postpartum women. It is characterized by local redness, heat, swelling, and a highly characteristic raised, indurated border (Fig. 16A). The onset is often preceded by prodromal symptoms of malaise for several hours, which may be accompanied by a severe constitutional reaction with chills, high fever, headache, vomiting, and joint pains. There is com

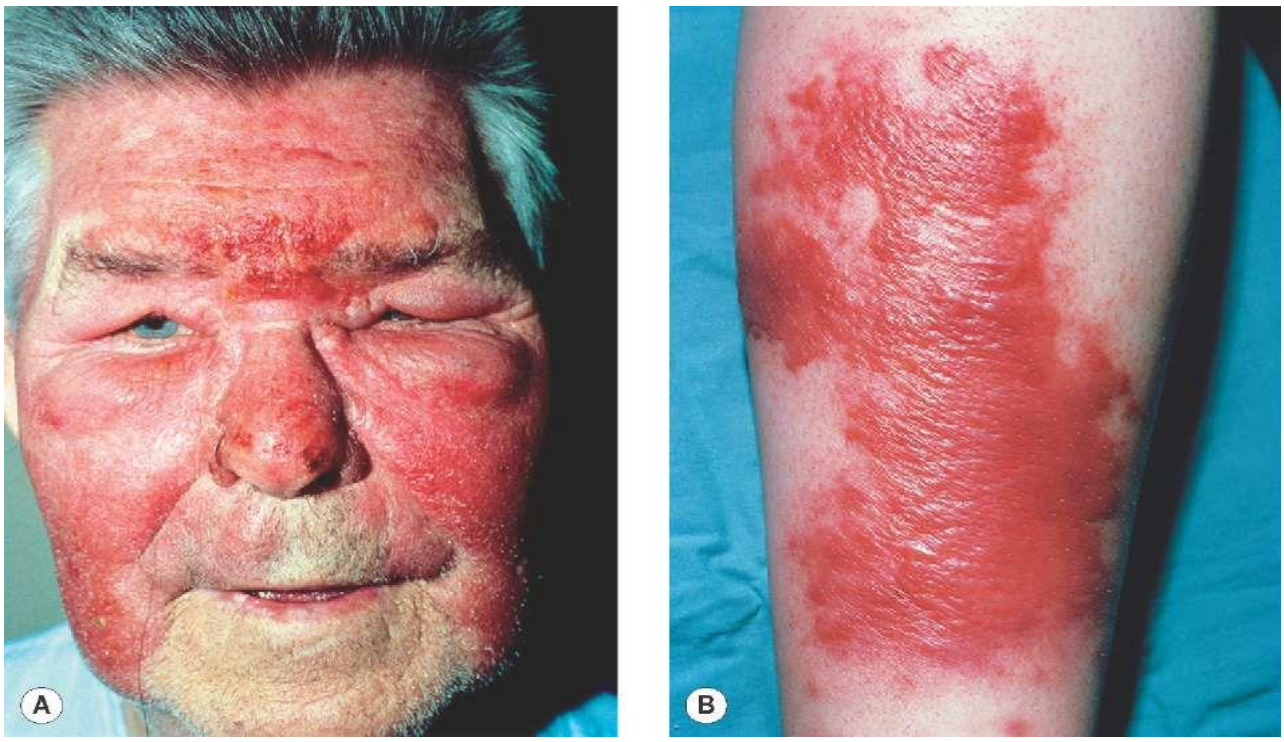


Fig. 16. Erysipelas

monly a polymorphonuclear leukocytosis of 20 000/mm^3 or more. However, many cases present solely as an erythematous lesion without associated systemic complaints.

The skin lesions may vary from transient hyperemia followed by slight desquamation to intense inflammation with vesicles or bullae. The eruption begins at any one point as an erythematous patch and spreads by peripheral extension. In the early stages the affected skin is scarlet, hot to the touch, branny, and swollen. A distinctive feature of the inflammation is the advancing edge of the patch. This is raised and sharply demarcated, and feels like a wall to the palpating finger. In some cases vesicles or bullae that contain seropurulent fluid occur and may result in local gangrene.

The legs and face are the most common sites affected. When on the face the inflammation generally begins on the cheek near the nose or in front of the lobe of the ear and spreads upward to the scalp, the hairline acting in some instances as a barrier against further extension. When on the legs, edema and bullous lesions are prominent features in many cases (Fig. 16B). Septicemia, deep cellulitis, or necrotizing fasciitis may occur as complications.

Predisposing causes are operative wounds, fissures (in the nares, in the auditory meatus, under the lobes of the ears, on the anus or penis, and between or under the toes, usually the little toe), abrasions or scratches, venous insufficiency, obesity, lymphedema, and chronic leg ulcers.

Recognition of the disease generally is not difficult. It may be confused with contact dermatitis from plants, drugs, or dyes, and with angioneurotic edema; however, with each of these, fever, pain, and tenderness are absent and itching is severe. A butterfly pattern on the face may mimic lupus ery- thematosus and ear involvement may suggest relapsing polychondritis.

Systemic penicillin is rapidly effective. Improvement in the general condition occurs in 24-48 h, but resolution of the cutaneous lesion may require several days. Vigorous treatment with antibiotics should be continued for at least 10 days. Locally, ice bags and cold compresses may be used. Leg involvement, especially when bullae are present, will more likely require hospitalization with intravenous antibiotics. The elderly, those with underlying immunocompromise, a longer duration of illness prior to presentation, and patients with leg ulcers will require longer inpatient stays.

Cellulitis

Cellulitis is a suppurative inflammation involving the subcutaneous tissue, caused most frequently by *S. pyogenes* or *S. aureus.* Usually, but not always, this follows some discernible wound. On the leg tinea pedis is the most common portal of entry. Mild local erythema and tenderness, malaise, and chilly sensations, or a sudden chill and fever may be present at the onset. The erythema rapidly becomes intense and spreads (Fig. 17). The area becomes infiltrated and pits on pressure. Sometimes the central part becomes nodular and surmounted by a vesicle that ruptures and discharges pus and necrotic material. Streaks of lymphangitis may spread from the area to the neighboring lymph glands (Fig. 18). Gangrene, meta- static abscesses, and grave sepsis may follow. These complications are unusual in immunocompetent adults, but children and compromised adults are at higher risk.

Hook evaluated 50 patients with cellulitis prospectively by culture of the primary site of infection (when one was present), and also by aspiration of the advancing edge, by skin biopsy, and by blood culture. In 24 patients the primary site was identified and in 17 P-hemolytic streptococci were isolated, with *S. aureus* being present in 13. Kielhofner et al also evaluated needle aspirates in cellulitis. Of 87 patients, 33 were culture- positive. Of significance is the fact that 26 of 46 patients (57%) were positive if there was coexistent underlying disease, such as hematologic malignancy, diabetes mellitus, intravenous drug abuse, or cardiovascular disorders. *S. aureus* was present in 33% and group A streptococci in 27%. Other cultures were seldom positive and yielded no additional information.

Initial empiric therapy should cover both staphylococci and streptococci. Initial therapy will be guided as in the above staphylococcal discussion. MRSA should be considered, and treatment strategies chosen may depend on whether the infection was hospital- or community-acquired, as outlined above.

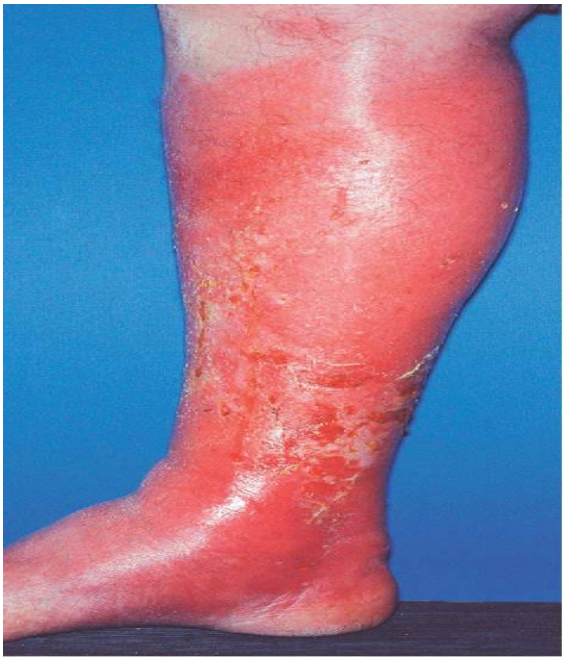


Fig. 17 Cellulitis.

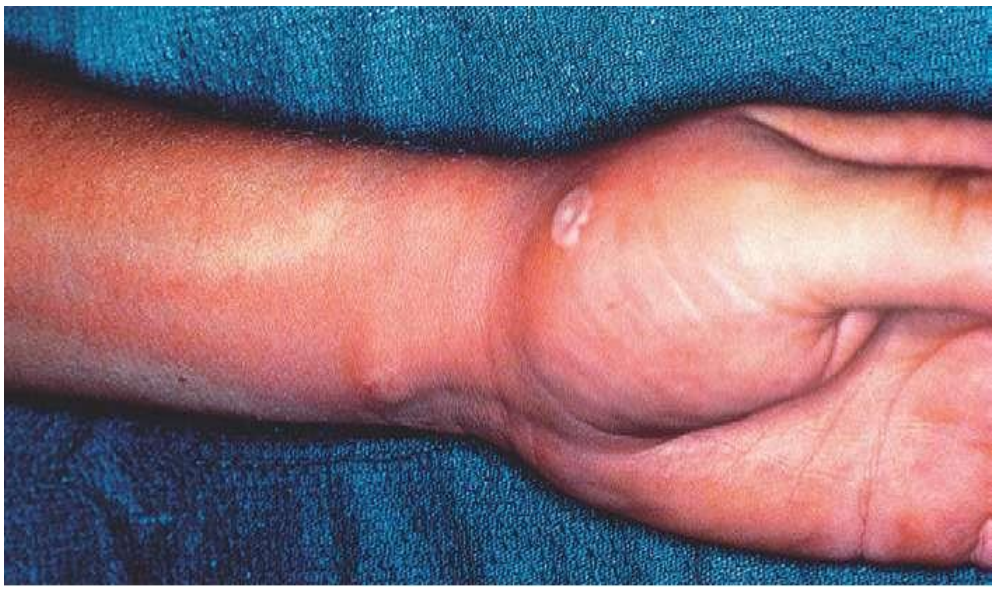


Fig. 18 Lymphangitis.

Chronic recurrent erysipelas, chronic lymphangitis

Erysipelas or cellulitis may be recurrent. Predisposing factors include alcoholism, diabetes, immunodeficiency, tinea pedis, venous stasis, lymphedema with or without lymphangiecta- sias, prosthetic surgery of the knee, a history of saphenous phlebectomy, lymphadenectomy, or irradiation.

Chronic lymphedema is the end result of recurrent bouts of bacterial lymphangitis and obstruction of the major lymphatic channels of the skin. The final result is a permanent hypertrophic fibro- sis to which the term elephantiasis nostras has been given. It must be differentiated from lymphangioma, acquired lymphangiectasia, and other causes such as neoplasms or filariasis.

During periods of active lymphangitis, antibiotics in large doses are beneficial and their use must be continued intermittently in smaller maintenance doses for long periods to achieve their full benefits. Compression therapy to decrease lymphedema will aid in the prevention of recurrence.

Necrotizing fasciitis

Necrotizing fasciitis is an acute necrotizing infection involving the fascia. It may follow surgery or perforating trauma, or may occur de novo. Within 24-48 h redness, pain, and edema quickly progress to central patches of dusky blue discolora- tion, with or without serosanguineous blisters (Fig. 19). Anesthesia of the involved

skin is very characteristic. By the fourth or fifth day, these purple areas become gangrenous.

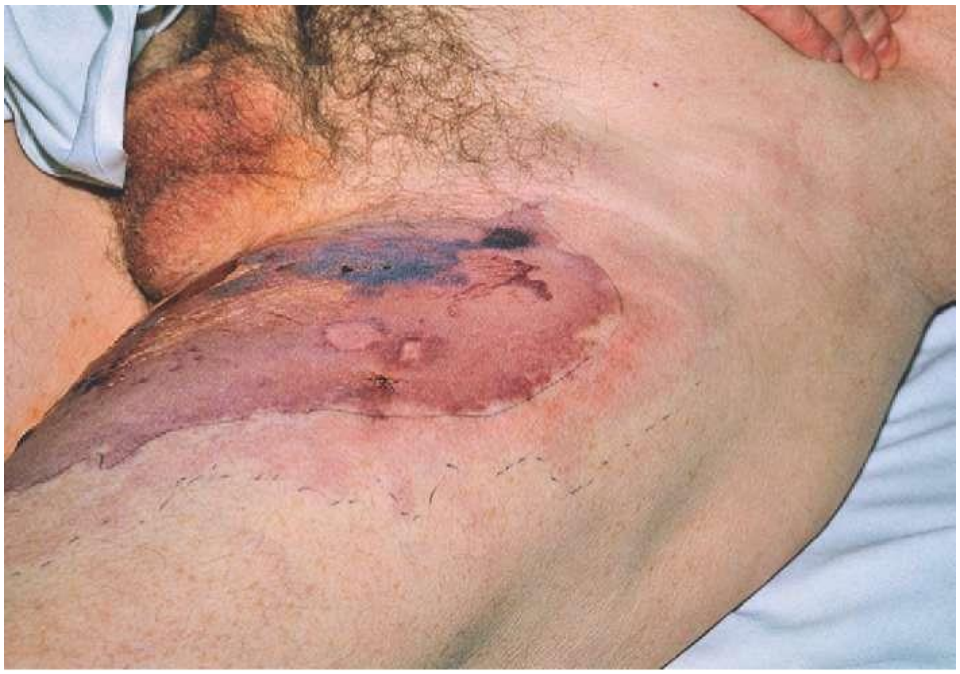


Fig. 19 Necrotizing fasciitis.

Many forms of virulent bacteria have been cultured from necrotizing fasciitis, including microaerophilic P-hemolytic streptococci, hemolytic staphylococcus, coliforms, enterococci, *Pseudomonas*, and *Bacteroides*. Both aerobic and anaerobic cultures should always be taken.

Early surgical debridement is an essential component of successful therapy. Signs and tests that can aid in delineating the extent of deep involvement include the presence of hypotension, an admission white blood cell count greater than 15.4 mm^3, serum sodium less than 135 mmol/L, and an MRI. It may be necessary to infiltrate the site with anesthetic, make a 2 cm incision down to the fascia, and probe with the finger. Lack of bleeding, a murky discharge, and lack of resistance to the probing finger are ominous signs. Treatment should include early surgical debridement, intravenously administered appropriate antibiotics, and supportive care. There may be a 20% mortality even in the best of circumstances. Poor prognostic factors are age over 50, underlying diabetes or atherosclerosis, delay of more than 7 days in diagnosis and surgical intervention, and infection on or near the trunk rather than the

more commonly involved extremities. Neonatal necrotizing fasciitis most commonly occurs on the abdominal wall and has a higher mortality rate than in adults.

Blistering distal dactylitis

Blistering distal dactylitis is characterized by tense superficial blisters occurring on a tender erythematous base over the volar fat pad of the phalanx of a finger or thumb or occasionally a toe (Fig. 20). The typical patient is aged between 2 and 16. Group A P-hemolytic streptococcus or *S. aureus* is the most common cause. These organisms may be cultured from blister fluid and occasionally from clinically inapparent infections of the nasopharynx or conjunctiva.

Perineal dermatitis

Clinically, this entity presents most commonly as a superficial perianal, well-demarcated rim of erythema (Fig. 21); sometimes fissuring may also be seen. Pain or tenderness, especially prominent on defecation, may lead to fecal retention in affected patients, who are usually between ages 1 and 8. It may not resemble a cellulitis, but rather a dermatitis. It may also affect the vulval and penile tissues. Group A streptococci are most often the cause; however, *S. aureus* may be recovered rarely. As the vast majority of infections are due to streptococci, a systemic penicillin or erythromycin combined with a topical antiseptic or antibiotic is the treatment of choice. The duration should be 14-21 days, depending on clinical response. Post-treatment swabs and urinalysis to monitor for post-streptococcal glomerulonephritis are recommended.

Streptococcal intertrigo

Infants and young children may develop a fiery-red erythema and maceration in the neck, axillae, or inguinal folds. There are no satellite lesions. It may be painful and have a foul odor. Group A P-hemolytic streptococci are the cause, and topical antibiotics and oral penicillin combined with a low-potency topical steroid is curative.

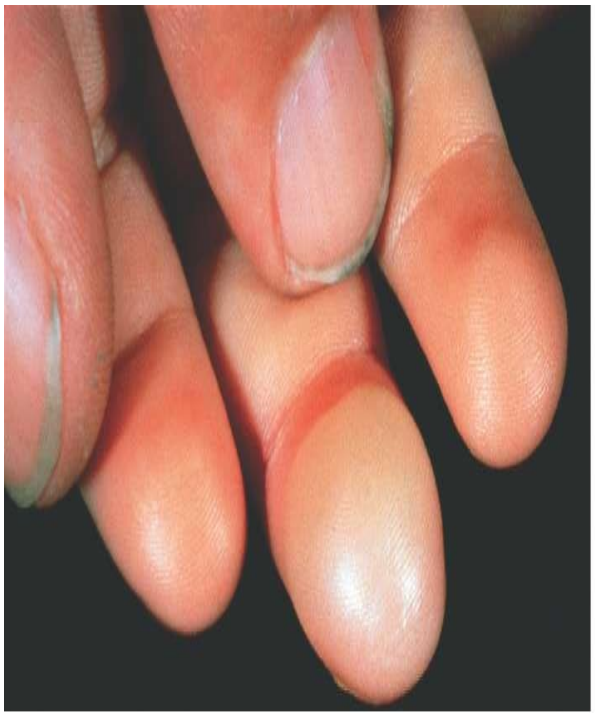


Fig. 20 Blistering dactylitis.

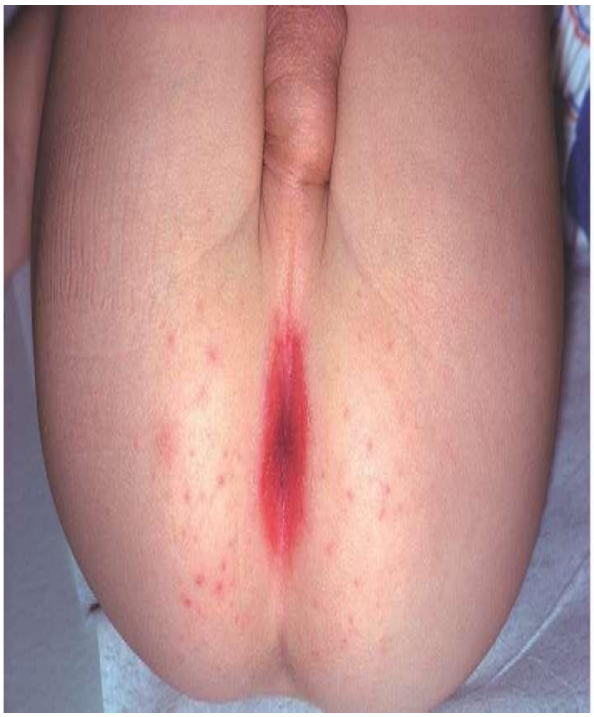


Fig. 21 Perianal dermatitis.

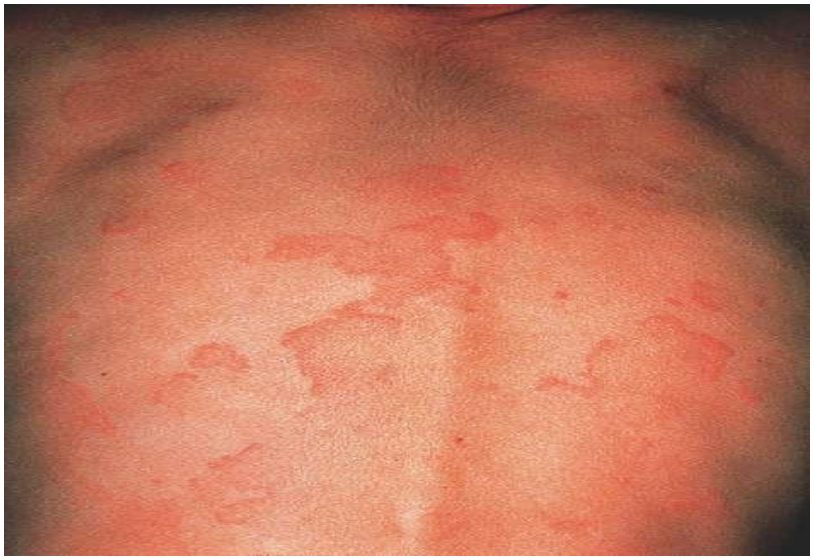


Fig. 22 Erythema

Erythema marginatum

Delayed nonsuppurative sequelae of streptococcal infections include erythema nodosum, post-streptococcal glomerulo- nephritis, and rheumatic fever. While the latter only follows pharyngitis or tonsillitis, two skin signs are among the diagnostic criteria of rheumatic fever—erythema marginatum and subcutaneous nodules. The remaining major signs making up the revised Jones criteria are carditis, polyarthritis, and chorea. Erythema marginatum appears as a spreading patchy erythema that migrates peripherally and often forms polycyclic configurations (Fig. 22). It is evanescent, appearing for a few hours or days on the trunk or proximal extremities. Heat may make it more visible and successive crops may appear over several weeks. It is usually part of the early phase of the disease, coexisting with carditis but usually preceding the arthritis. Children younger than 5 are more likely to manifest the eruption than older patients. A skin biopsy will show a perivascular and interstitial polymorphonuclear leukocyte predominance. In contrast, the subcutaneous nodules occur over bony prominences and appear as a late manifestation. The lesions usually are asymptomatic and resolve spontaneously.

Group B streptococcal infection

Streptococcus agalactiae is the major cause of bacterial sepsis and meningitis in neonates. It may cause orbital cellulitis or facial erysipelas in these patients. Up to 25% of healthy adults harbor group B streptococcus in their genital or gastrointestinal tract. It has been reported to cause balanitis, toxic shock-like syndrome, cellulitis, perianal dermatitis, recurrent erysipelas, or blistering dactylitis in adults. Diabetes mellitus, neurologic impairment, cirrhosis, and peripheral vascular disease predispose patients to infection with this organism. In the postpar- tum period, abdominal or perineal erysipelas may be due to this organism.

Streptococcus iniae infections

Cellulitis of the hands may be caused by this fish pathogen. In Asian cuisine tilapia (also known as St Peter's fish or Hawaiian sunfish) is often purchased live

from aquariums in retail stores. In cleaning the freshly killed fish before cooking, puncture wounds of the skin may be sustained from the dorsal fin, a fish bone, or a knife. Preparation of other raw seafood may also lead to this infection. Within 24 h fever, lymphangitis, and cellulitis without skin necrosis or bulla formation occur. Treatment with penicillin is curative.

Miscellaneous Gram-positive skin infections Erysipeloid of Rosenbach

The most frequent form of erysipeloid is a purplish margin- ated swelling on the hands. The first symptom is pain at the site of inoculation; this is followed by swelling and erythema. The most distinctive feature is the sharply marginated and often polygonal patches of bluish erythema (Fig. 23). The erythema slowly spreads to produce a sharply defined, slightly elevated zone that extends peripherally as the central portion fades away. If the finger is involved, the swelling and tenseness make movement difficult. Vesicles frequently occur.

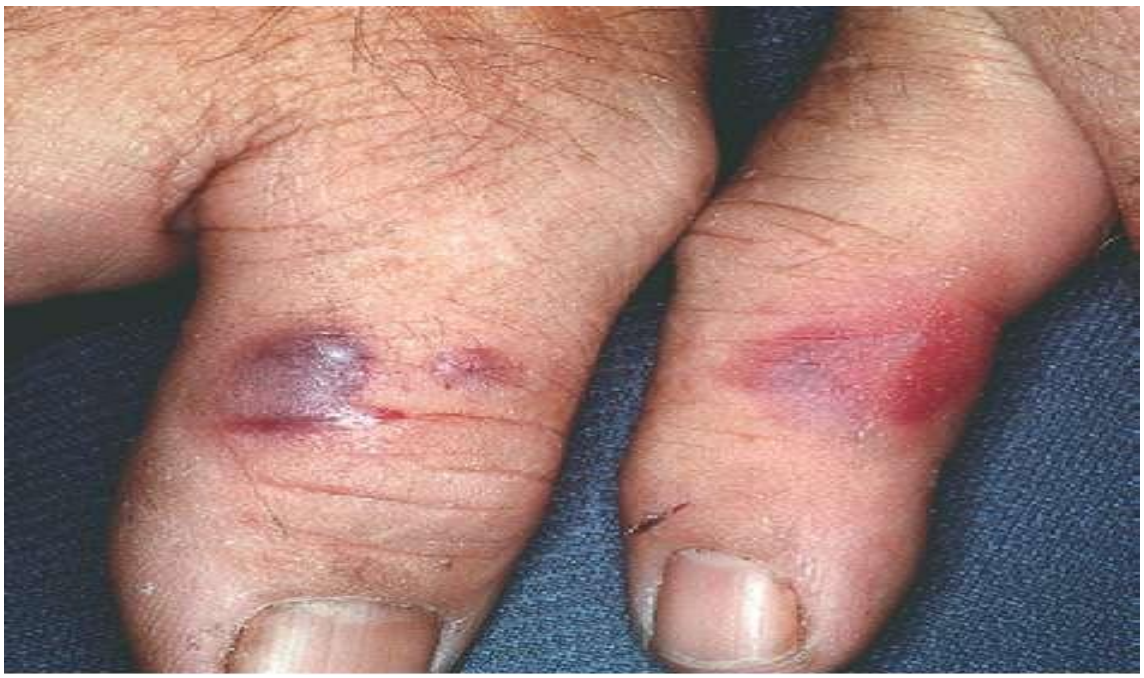


Fig. 23 Erysipeloid.

Another characteristic of the disease is its migratory nature; new purplish-red patches appear at nearby areas. If the infection originally involved one finger, eventually all of the fingers and the dorsum of the hand, palm, or both may become

infected, the erythema appearing and disappearing; or extension may take place by continuity. The disease involutes without desquamation or suppuration.

A diffuse or generalized eruption in regions remote from the site of inoculation may occur, with fever and arthritic symptoms. Rarely, septicemia may eventuate in endocarditis, with prolonged fever and constitutional symptoms.

The infection is caused by *Erysipelothrix rhusiopathiae. E. rhu- siopathiae* is present on dead matter of animal origin. Swine are more frequently infected than any other animal. A large percentage of healthy swine are carriers of the organism. Turkeys are also often infected and the disease may arise from handling contaminated dressed turkeys. It is also present in the slime of saltwater fish, on crabs, and on other shellfish.

The disease is widespread along the entire Atlantic seacoast among commercial fishermen who handle live fish, crabs, and shellfish. The infection also occurs among veterinarians and in the meat-packing industry, principally from handling pork products.

E. rhusiopathiae is a rod-shaped, nonmotile, Gram-positive organism that tends to form long-branching filaments. The organism is cultured best on media fortified with serum, at room temperature.

Treatment

The majority of the mild cases of erysipeloid run a self-limited course of about 3 weeks. In some patients, after a short period of apparent cure, the eruption reappears either in the same area or, more likely, in an adjacent previously uninvolved area. Penicillin, 1 g/day for 5-10 days, or ampicillin, 500 mg four times daily, is the best treatment for localized disease. If penicillin cannot be used, ciprofloxacin, clindamycin, or imipenem may be used. For systemic forms 12-20 million units/day of intravenous penicillin for up to 6 weeks may be necessary.

Pneumococcal cellulitis

Cellulitis may be caused by *Streptococcus pneumoniae.* Children present with facial or periorbital cellulitis, which may manifest a violaceous hue or bullae. Most

patients under 36 months of age are previously healthy. Fever, leukocytosis, and septi- cemia are nearly universal. Response to treatment with penicillin or, in resistant cases, vancomycin is excellent. As most reported disease was caused by those strains included in the pneumococcal vaccine, this condition has become rare, as has occurred with *Haemophilus influenzae* cellulitis. Chronically ill or immunosuppressed adults also may develop pneumococcal cellulitis, or other soft tissue infections such as abscesses or pyomyositis. In patients with diabetes or substance abuse, extremity involvement is the rule, while in those with systemic lupus erythematosus, nephritic syndrome, hematologic disorders or HIV disease, the head, neck, and upper torso are typically affected. Skin involvement may also be seen as a surgical wound infection. Septicemia, tissue necrosis, and suppurative complications are frequent, so aggressive management with surgical drainage and intravenous antibiotics directed at the susceptibility of the cultured organism is vital.

Anthrax

Cutaneous anthrax is uncommon in much of the world; human infection generally results from contact with infected animals or the handling of hides or other animal products from stock that has died from splenic fever. Cattlemen, woolsorters, tanners, butchers, and workers in the goat-hair industry are most liable to infection. Human-to-human transmission has occurred from contact with dressings from lesions. As the spores of *Bacillus anthracis* persist and may be aerosolized, it is a bioterrorism threat. In 2001 an outbreak of cutaneous disease resulted from powder-containing envelopes being sent through the mail.

Anthrax is an acute infectious disease characterized by a rapidly necrosing, painless eschar with suppurative regional adenitis. Three forms of the disease occur in humans: cutaneous, accounting for 95% of cases worldwide and nearly all US cases; inhalation, known as woolsorter's disease; and gastrointestinal, not yet reported in the US. The first clinical manifestation of the cutaneous form is an inflammatory papule, which begins about 3-7 days after inoculation, usually on an exposed site. The inflammation develops rapidly so that there is a bulla surrounded by intense edema and infiltration within another 24-36 h. It then ruptures spontane-

ously and a dark brown or black eschar is visible surrounded by vesicles situated on a red, hot, swollen, and indurated area. The lesion is neither tender nor painful. This is of diagnostic importance. Pustules are almost never present. The regional lymph glands become tender and enlarged, and frequently suppurate.

In severe cases the inflammatory signs increase; there is extensive edematous swelling and other bullae and necrotic lesions develop, accompanied by a high temperature and prostration, terminating in death in a few days or weeks. This may occur in up to 20% of untreated cases. In mild cases the constitutional symptoms are sometimes slight; the gangrenous skin sloughs and the resulting ulcer heals.

Internally, inhalation anthrax is manifested as a necrotizing, hemorrhagic mediastinal infection. Anthrax spores involve the alveoli, then the hilar and tracheobronchial nodes. Bacteremia followed by hemorrhagic meningitis is the usual sequence of events, almost always ending in death. Gastrointestinal anthrax results when spores are ingested and multiply in the intestinal submucosa. A necrotic ulcerative lesion in the terminal ileum or cecum may lead to hemorrhage.

The disease is produced by *Bacillus anthracis*, a large, square- ended, rod-shaped, Gram-positive organism, which occurs singly or in pairs in smears from the blood or in material from the local lesion, or in long chains on artificial media, where it tends to form spores. The bacillus possesses three virulence factors: a polyglutamate acid capsule inhibiting phagocytosis; an edema toxin, composed of edema factor and a transport protein termed protective antigen; and lethal toxin, composed of lethal factor plus protective antigen.

A biopsy should be obtained. This allows for immunohisto- chemical and polymerase chain reaction (PCR) studies, as well as routine histology and tissue Gram stain. Microscopically, there is loss of the epidermis at the site of the ulcer, with surrounding spongiosis and intraepidermal vesicles. Leukocytes are abundant in the epidermis. The dermis is edematous and infiltrated with abundant erythrocytes and neutrophils. Vasodilation is marked. The causative organisms are numerous and are easily seen, especially with Gram stain.

The diagnosis is made by demonstration of the causative agent in smears and cultures of the local material. Because aerobic nonpathogenic bacilli may be confused with *B. anthra- cis,* a specific y-bacteriophage may be used to identify the organism. All virulent strains are pathogenic to mice. A fourfold rise in the enzyme-linked immunosorbent assay (ELISA) titer in paired serum specimens for antibodies against protective antigen or capsular antigens confirms the diagnosis. The characteristic gangrenous lesion, surrounded by vesiculation, intense swelling and redness, lack of pain, and the occupation of the victim are accessory factors. Staphylococcal carbuncle is the most easily confused entity, but here tenderness is prominent.

Early diagnosis and prompt treatment with ciprofloxacin, 500 mg, or doxycycline, 100 mg, both given twice a day for 60 days, are curative in the cutaneous form when there are no systemic symptoms, lesions are not on the head or neck and are without significant edema, and the patient is not a child under 2. In these latter conditions, more aggressive intravenous therapy is required, as outlined in the CDC management guidelines available at the CDC website. Asymptomatic exposed individuals should be given prophylactic treatment with a 6-week course of doxycycline or ciprofloxacin. A vaccine is available.

Listeriosis

Listeria monocytogenes is a Gram-positive bacillus with rounded ends that may be isolated from soil, water, animals, and asymptomatic individuals. Human infection probably occurs via the gastrointestinal tract; however, in the majority of patients the portal of entry is unknown. Infections in humans usually produce meningitis or encephalitis with monocytosis. Risk factors include alcoholism, advanced age, pregnancy, and immunosuppression.

Cutaneous listeriosis is a rare disease. Veterinarians may contract cutaneous listeriosis from an aborting cow. The organism in the skin lesions is identical to that isolated from the fetus. The eruption consists of erythematous tender papules and pustules scattered over the hands and arms. There may be axillary lymphadenopathy,

fever, malaise, and headache. Treatment with sulfonamides causes the disease to disappear within a few days.

Neonates are also at risk. Smith et al reported a newborn of an HIV-infected mother who died with a diffuse papular, petechial, and pustular eruption secondary to disseminated listeriosis. Listeria may cause a granulomatous disease of infants (granulomatosis infanta peptica). The endocarditis, meningitis, and encephalitis caused by *Listeria* may be accompanied by petechiae and papules in the skin.

Cases of listeriosis may easily be missed on bacteriologic examination, because the organism produces few colonies on original culture and may be dismissed as a streptococcus or as a contaminant diphtheroid because of the similarity in Gram-stained specimens. Serologic tests help to make the diagnosis.

L. monocytogenes is sensitive to most antibiotics. Ampicillin is the recommended antibiotic of choice, while trimethoprim- sulfamethoxazole is an effective alternate agent.

Cutaneous diphtheria

The skin may become infected by the Klebs-Loeffler bacillus, *Corynebacterium diphtheriae,* in the form of ulcerations. The ulcer is punched out and has hard, rolled, elevated edges with a pale blue tinge (Fig. 24). Often the lesion is covered with a leathery, grayish membrane. Regional lymph nodes may be affected. Another type of skin involvement is that occurring in eczematous, impetiginous, vesicular, or pustular scratches, from which *C. diphtheriae* may be recovered. Postdiphtherial paralysis and potentially fatal cardiac complications may occur. These are mediated by a potent exotoxin, which stops protein production at the ribosome level.

Cutaneous diphtheria is common in tropical areas. Most of the cases occurring in the US are in nonimmunized migrant farm worker families and in elderly alcoholics. Travelers to developing countries may also import disease.

Treatment consists of intramuscular injections of diphtheria antitoxin, 20 000-40 000 U, after a conjunctival test has been performed to rule out hypersensitivity to horse serum. One drop of antitoxin diluted 1 : 10 is placed in one eye and a drop of

saline in the other eye. If after 30 min there is no reaction, 20 000-40 000 U of antitoxin is given. Erythromycin, 2 g/day, is the drug of choice, unless large proportions of resistant organism are known in the area. In severe cases intravenous penicillin G, 600 000 U/day for 14 days, is indicated. Rifampin, 600 mg/day for 7 days, will eliminate the carrier state.

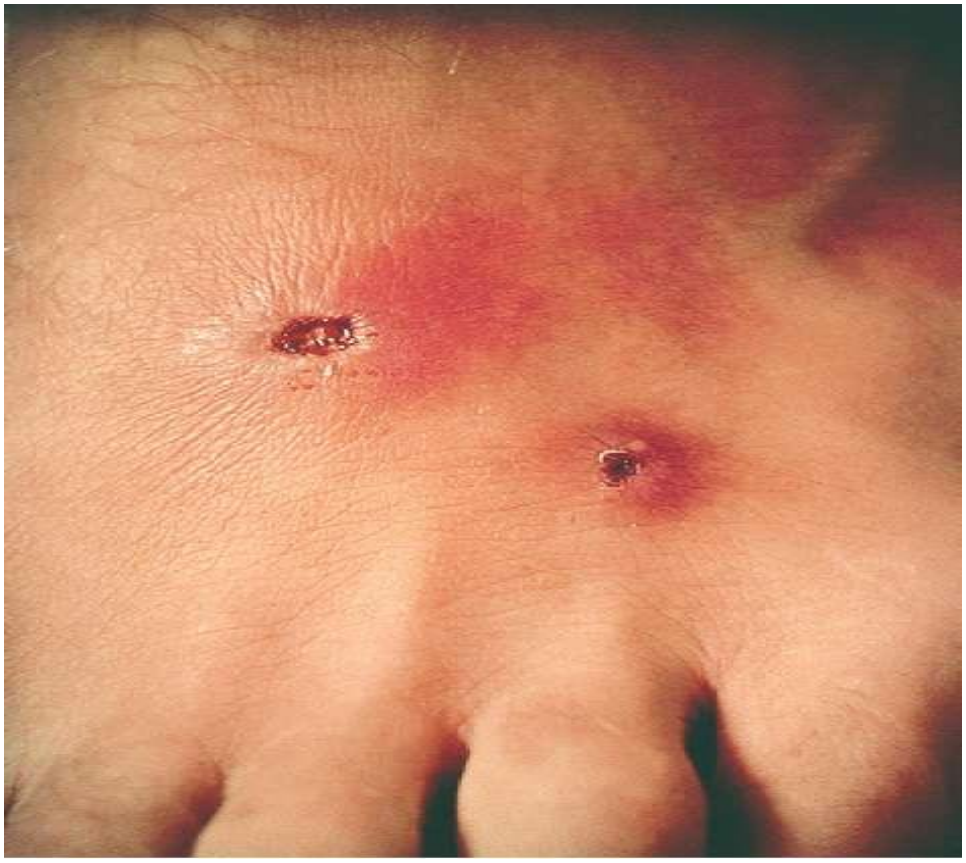


Fig. 24 Cutaneous diphtheria.

Corynebacterium jeikeium sepsis

Corynebacterium jeikeium colonizes the skin of healthy individuals, with the highest concentration being in the axillary and perineal areas. Hospitalized patients are more heavily colonized. Patients with granulocytopenia, indwelling catheters, prosthetic devices, exposure to multiple antibiotics, and valvular defects are at highest risk for the development of sepsis or endocarditis. A papular eruption, cellulitis, subcutaneous abscesses, tissue necrosis, hemorrhagic pustules, and palpable purpura may be seen on the skin. Vancomycin is the drug of choice. Mortality is over 30% in those with leukopenia, but only 5% if the marrow recovers.

Hematopoietic growth factors should then be considered as adjunctive therapy in these patients.

Desert sore

Also known as veldt sore, septic sore, diphtheric desert sore, and Barcoo rot, desert sore is an ulcerative disease that is endemic among bushmen and soldiers in Australia and Burma. The disease is characterized by the occurrence of grouped vesicles on the extremities, chiefly on the shins, knees, and backs of the hands. These rupture and form superficial indolent ulcers. The ulcers enlarge and may attain a diameter of 2 cm. The floor of the ulcer may be covered by a diphtheritic membrane. The original lesions may start as insect bites. Cultures show staphylococci, streptococci, and *Corynebacterium diphtheriae.* Treatment of the desert sore is with diphtheria antitoxin if *C. diphtheriae* is present. Antibiotic ointments are used topically, and oral penicillin or erythromycin is the treatment of choice.

Tropical ulcer

Tropical ulcer is also known as tropical phagedena, Aden ulcer, Malabar ulcer, and jungle rot, as well as various native terms. It occurs on exposed parts of the body, chiefly the legs and arms, and frequently on pre-existing abrasions or sores, sometimes beginning from a mere scratch. As a rule, only one extremity is affected and usually there is a single lesion, although it is not uncommon to find multiple ulcers on both legs. Satellite lesions ordinarily occur as a result of autoinoculation.

The lesions begin with inflammatory papules that progress into vesicles and rupture with the formation of an ulcer. The ulcers vary in diameter and may, through coalescence, form extensive lesions. The lesions of some varieties are elevated or deeply depressed, and generally the edges are undermined and either smooth or ragged. At times the ulcers are covered by thick, dirty crusts or by whitish pseudomembranes. The edges are flat, without thickening, and around them there is a zone of inflammation characterized by redness, swelling, and some tenderness. Other than a slight itching, there is usually no distress.

The disease is most common in native laborers and in schoolchildren during the rainy season; it is probably caused in many instances by the bites of insects, filth, and pyogenic infection. Malnutrition appears to be a predisposing factor.

Tropical ulcer is a descriptive term used when more specific etiologic classification is not documented. If investigated microbiologically, anaerobic bacteria together with aerobes, some of them facultative anaerobes, are present in early lesions. The differential diagnosis includes a wide variety of conditions. The septic desert ulcer is superficial and shows *C. diphtheriae.* The gummatous ulcer is punched out, with a sinking floor. Other signs of syphilis are present, and the sero- logic test for syphilis is positive. The tuberculous ulcer is undermined and usually not found on the leg. The mycobac- terium can be isolated from the lesion. The mycotic ulcer is noduloulcerative, with demonstrable fungi both by direct microscopic examination and by culture. The frambesia ulcer grows rapidly and yields *Treponema pertenue.* The Buruli ulcer shows abundant *Mycobacterium ulcerans* in biopsies. The leish- manial ulcer contains *Leishmania tropica;* it is not usually found on the leg. Carcinoma must be considered in any leg ulcer of long duration. A biopsy is indicated.

The arteriosclerotic ulcer is seen in older people at sites of frequent trauma; it is deep and penetrates through the deep fascia to expose tendons. The hypertensive ischemic ulcer is caused by thrombosis of the cutaneous arterioles. These painful ulcers are extremely shallow, usually bilateral, and seen most frequently on the mid- and lower parts of the leg. Varicosities are usually absent. The varicose or venous ulcer is shallow and has irregularly shaped edges. It is located typically on the lower half of the shins, mostly above and anterior to the medial malleolus along the course of the long saphenous vein.

The ulcers of blood dyscrasias are frequent in sickle cell anemia, in hereditary spherocytosis, Mediterranean anemia, and Felty syndrome. The diagnosis is aided by the fact that there is hypersplenism in each of these diseases. The ulcer of rheumatoid arthritis occurs frequently in patients who have abundant concomitant subcutaneous nodules. The ulcer of Kaposi sarcoma frequently occurs on the lower extremities and

is accompanied by a purpuric discoloration of the skin and by other violaceous nodules that may occur anywhere on the body. In the tropics it is endemic among the South African Bantus.

Prevention of the disease is aided by protection from insect bites and from predisposing causes, such as debility, malnutrition, and filth. Topical and systemic antibiotic treatment is indicated in most patients.

Erythrasma

Erythrasma is characterized by sharply delineated, dry, brown, slightly scaling patches occurring in the intertriginous areas, especially the axillae, the genitocrural crease (Fig. 25), and the webs between the fourth and fifth toes and, less commonly, the third and fourth toes. There may also be patches in the intergluteal cleft, perianal skin, and inframam- mary area. Rarely, widespread eruptions with lamellated plaques occur.

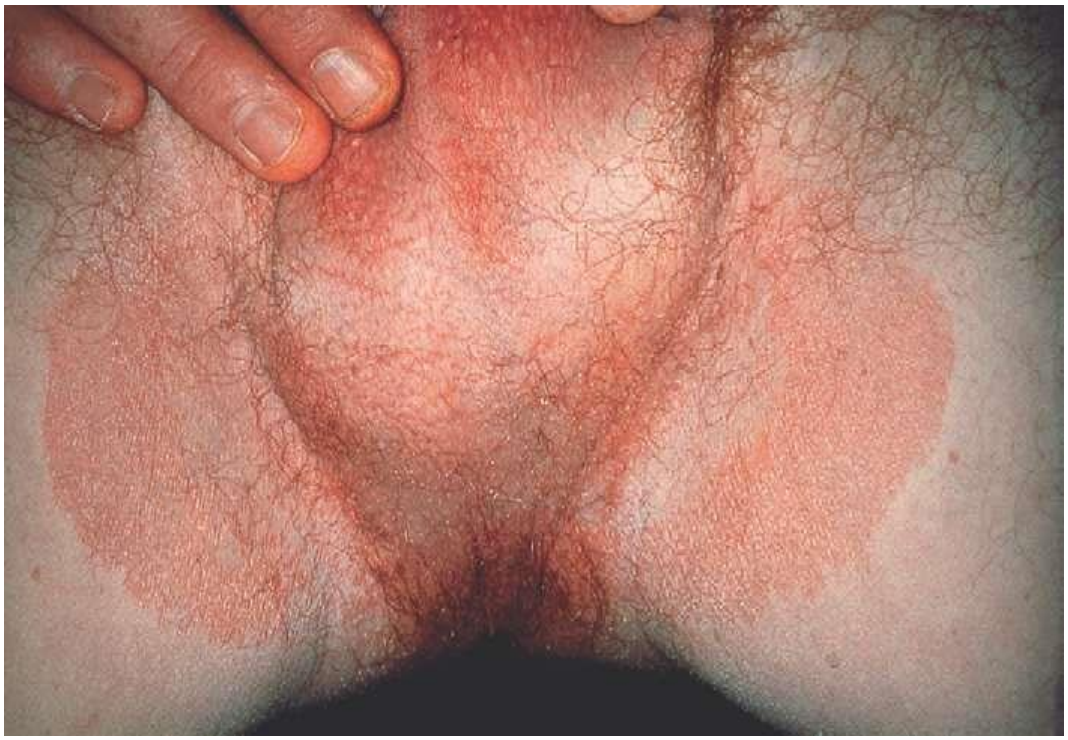


Fig. 25 Erythrasma.

The lesions are asymptomatic except in the groins, where there may be some itching and burning. Patients with extensive erythrasma have been found to have diabetes mellitus or other debilitating diseases. Erythrasma is caused by the diphtheroid *Corynebacterium minutissimum.* This Gram- positive non-spore-forming

rod-shaped organism may occasionally cause cutaneous gran- ulomas or bacteremia in immunocompromised patients. Two other diseases caused by a *Corynebacterium,* pitted keratolysis and trichomycosis axillaris, may occur as a triad. In the differential diagnosis, tinea cruris caused by fungi, intertrigo, seborrheic dermatitis, inverse psoriasis, candidiasis, and lichen simplex chronicus must be considered.

The Wood's light is the diagnostic medium for erythrasma. The affected areas show a coral red fluorescence, which results from the presence of a porphyrin. Washing of the affected area before examination may eliminate the fluorescence. Topical erythromycin solution or topical clindamycin is easily applied and rapidly effective. Oral erythromycin, 250 mg four times a day for 1 week, tolnaftate solution, applied twice a day for 2-3 weeks, and topical miconazole are equally effective.

Arcanobacterium haemolyticum infection

This pleomorphic, nonmotile, non-spore-forming, P-hemolytic, Gram-positive bacillus causes pharyngitis and an exanthem in young adults. Acute pharyngitis in the 10- to 30-year-old age group is only due to group A streptococci 10-25% of the time. A proportion of the remainder will be caused by *Arcanobacterium haemolyticum.*

The exanthem is an erythematous morbilliform or scarlati- niform eruption involving the trunk and extremities. Although it usually spares the face, palms, and soles, atypical acral involvement has been reported. The general clinical presentation may include mild pharyngitis, severe diphtheria-like illness, or even septicemia.

Cultures for this organism should be done on 5% blood agar plates and observed for 48 h. The diagnostic features are enhanced by a 5-8% CO_2 atmosphere during incubation at 37°C. Routine pharyngeal specimens are done on sheep blood agar and will miss the growth of this organism because of its slow hemolytic rate and growth of normal throat flora. Treatment of choice is erythromycin, or in the case of severe infection, high-dose penicillin G.

Intertrigo

Intertrigo is a superficial inflammatory dermatitis occurring where two skin surfaces are in apposition. It is discussed here because of its clinical association with

several diseases in this chapter. As a result of friction (skin rubbing skin), heat, and moisture, the affected fold becomes erythematous, macerated, and secondarily infected. There may be erosions, fissures, and exudation, with symptoms of burning and itching. Intertrigo is most frequently seen during hot and humid weather, chiefly in obese persons. Children and the elderly are also predisposed. This type of dermatitis may involve the retroauricular areas; the folds of the upper eyelids; the creases of the neck, axillae, and antecubital areas; finger webs; inframammary area; umbilicus; inguinal, perineal, and intergluteal areas; popliteal spaces; and toe webs.

As a result of the maceration, a secondary infection by bacteria or fungi is induced. The inframammary area in obese women is most frequently the site of intertriginous candidia- sis. The groins are also frequently affected by fungal (yeast or dermatophyte) infection. Bacterial infection may be caused by streptococci, staphylococci, *Pseudomonas,* or *Corynebacteria.* Streptococcal intertrigo favors the neck, axillary, and inguinal folds of young children. There is a well-demarcated fiery-red, moist, shiny surface, a foul smell and an absence of satellite lesions.

In the differential diagnosis, seborrheic dermatitis typically involves the skinfolds. Intertriginous psoriasis and erythrasma are frequently overlooked, especially when the inguinal and intergluteal areas or fourth toe webs are involved, as in erythrasma. Fissured groin lesions may be a manifestation of Langerhans cell histiocytosis.

Treatment is directed toward the elimination of the maceration. Appropriate antibiotics or fungicides are applied locally. The apposing skin surfaces may be separated with gauze or other appropriate dressings. Botulinum toxin type A has been used to dry out areas predisposed to recurrent disease.

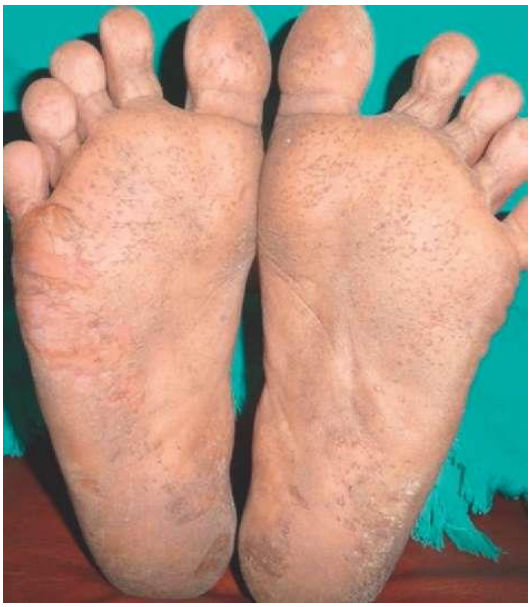


Fig. 26 Pitted keratolysis.

Castellani paint is also useful, as is an antibacterial ointment. Low-potency topical corticosteroids and topical tacrolimus are helpful to reduce inflammation, but should always be used in conjunction with a topical antifungal or antimicrobial agent.

Pitted keratolysis

In this bacterial infection of the plantar stratum corneum the thick, weight-bearing portions of the soles become gradually covered with shallow asymptomatic discrete round pits 1-3 mm in diameter, some of which become confluent, forming furrows (Fig. 26). Men with very sweaty feet during hot, humid weather are most susceptible. Rarely, palmar lesions may occur. No discomfort is produced, though the lesions are often malodorous.

Most disease is caused by *Kytococcus sedentarius.* It produces two serine proteases which can degrade keratin. Clinical diagnosis is not difficult, based on its unique appearance. Histologic examination generally demonstrates keratin pits lined by small cocci as well as filamentous bacteria.

Topical erythromycin or clindamycin is curative. Miconazole or clotrimazole cream and Whitfield ointment are effective alternatives. Both 5% benzoyl peroxide gel and a 10-20% solution of aluminum chloride may be used. Botulinum toxin helps if there is associated hyperhidrosis.

Infections and gangrene of the skin (dermatitis gangrenosa)

Gangrene of the skin results from loss of the blood supply of a particular area and, in some instances, from bacterial invasion that promotes necrosis and sloughing of the skin. The various forms of bacterial infection causing gangrene will be discussed here. The infectious causes are often severe and acute in nature. These may involve deep tissues and MRI may delineate the depth of involvement. Vascular gangrene, purpura fulminans, and diabetic gangrene are covered in Chapter 35; vaccinia gangrenosa in Chapter 19; and necrotiz- ing fasciitis earlier in this chapter.

Gas gangrene (clostridial myonecrosis)

Gas gangrene is the most severe form of infectious gangrene; it develops in deep lacerated wounds of muscle tissue (Fig. 27). The incubation period is only a few hours. Onset is usually sudden and is characterized by a chill, a rise in temperature, marked prostration, and severe local pain.

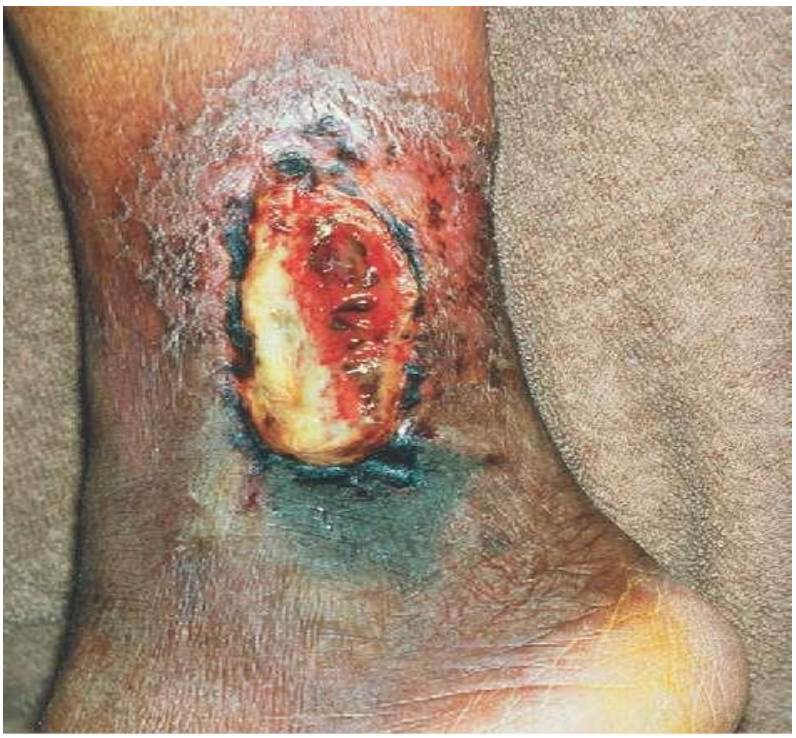


Fig. 27 Clostridial gas gangrene.

Gas bubbles (chiefly hydrogen) produced by the infection cause crepitation when the area is palpated. A mousy odor is characteristic. A plain radiograph will demonstrate the air. Gas gangrene is caused by a variety of species of the genus *Clostridium*, most frequently *Clostridium perfringens*, *Clostridium oedematiens*,

Clostridium septicum, Clostridium difficile, and *Clostridium haemolyticum.* These are thick, Gram-positive rods. *Clostridium* spores are resistant to skin sterilization chemicals; if injecting a site that is being soiled by stool incontinence, a mechanical wash prior to the sterile procedure, followed by an occlusive sterile dressing, is recommended.

A subacute variety occurs, which may be due to an anaerobic streptococcus (peptostreptococcus), *Bacteroides,* or *Prevotella.* This nonclostridial myositis may be clinically similar, but with delayed onset (several days). The purulent exudate has a foul odor, and Gram-positive cocci in chains are present. It is important to distinguish these two entities, since involved muscle may recover in nonclostridial myositis, and debridement may safely be limited to removal of grossly necrotic muscle. Infections with both clostridial and nonclostridial organisms such as *Streptococcus faecalis, Streptococcus anginosus, Proteus, E. coli, Bacteroides,* and

Klebsiella species may also cause crepi- tant cellulitis, when the infection is limited to the subcutaneous tissue. Treatment of all clostridial infections is wide surgical debridement and intensive antibiotic therapy with intravenous penicillin G and clindamycin. Occasional cases of clindamycin- resistant *C. perfringens* are being reported. In such cases vanco- mycin may be an effective alternative. Hyperbaric oxygen therapy may be of value if immediately available. Infections in patients with cirrhosis and diabetes have a poorer prognosis.

Chronic undermining burrowing ulcers (Meleney gangrene)

This entity was first described by Meleney as postoperative progressive bacterial synergetic gangrene. It usually follows drainage of peritoneal abscess, lung abscess, or chronic empyema. After 1 or 2 weeks the wound markings or retention suture holes assume a carbunculoid appearance, finally differentiating into three skin zones: outer, bright red; middle, dusky purple; and inner, gangrenous with a central area of granulation tissue. The pain is excruciating. In Meleney postoperative progressive gangrene, the essential organism is a microaerophilic, non-hemolytic streptococcus (peptostrepto- coccus) in the spreading periphery of the lesion, associated with *S. aureus* or Enterobacteriaceae in the zone of gangrene. This disease

is differentiated from ecthyma gangrenosum, which begins as vesicles rapidly progressing to pustulation and gangrenous ulceration in debilitated subjects, and is due to *P. aeruginosa.* Amebic infection with gangrene usually follows amebic abscess of the liver. The margins of the ulcer are raised and everted, and the granulations have the appearance of raw beef covered with shreds of necrotic material. Glairy pus can be expressed from the margins. Pyoderma gan- grenosum occurs in a different setting, lacks the bacterial findings, and does not respond to antibiotic therapy. Fusospirochetal gangrene occurs following a human bite.

Wide excision and grafting are primary therapy. Antimicrobial agents, penicillin, and an aminoglycoside should be given as adjunctive therapy.

Fournier gangrene of the penis or scrotum

Fournier syndrome is a gangrenous infection of the penis, scrotum, or perineum, which may be due to infection with group A streptococci or a mixed infection with enteric bacilli and anaerobes. This is usually considered a form of necrotizing fasciitis, as it spreads along fascial planes. Peak incidence is between 20 and 50 years, but cases have been reported in children. Diabetes mellitus, obesity, poor personal hygiene, long-standing oral steroid therapy, and chronic alcoholism are predisposing factors. Culture for aerobic and anaerobic organisms should be carried out, and appropriate antibiotics started; surgical debridement and general support should be instituted.

Actinomycosis

Actinomyces are anaerobic, Gram-positive, filamentous bacteria. They colonize the mouth, colon, and urogenital track. Infections are seen most often in the cervicofacial area but also commonly on the abdominal region, thoracic area, or pelvis. Middle-aged men are affected most often. The lesions begin as firm nodules or plaques and develop draining sinuses. Grains or sulfur granules may be present in the exudate, just as in fungal mycetomas. In the cervicofacial region, the infection is known as lumpy jaw. The underlying bone may be involved with periostitis or osteomyelitis. Mandibular infection is seen four times as often as maxillary involvement (Fig. 28).

The abdomen may be involved after a ruptured appendix or a gastrointestinal surgical procedure. Extension of the infection into the abdominal wall may produce draining sinuses on the abdominal skin. In the thoracic region, lung infection may spread to the thoracic wall.

Oropharyngeal actinomycosis is usually caused by *Actinomyces israelii* and *Actinomyces gerencseriae.* The condition is often clinically misdiagnosed as a malignancy, and it is the histological appearance of the characteristic granules that allows diagnosis. Sulfur granules consist of fine delicate branching filaments.

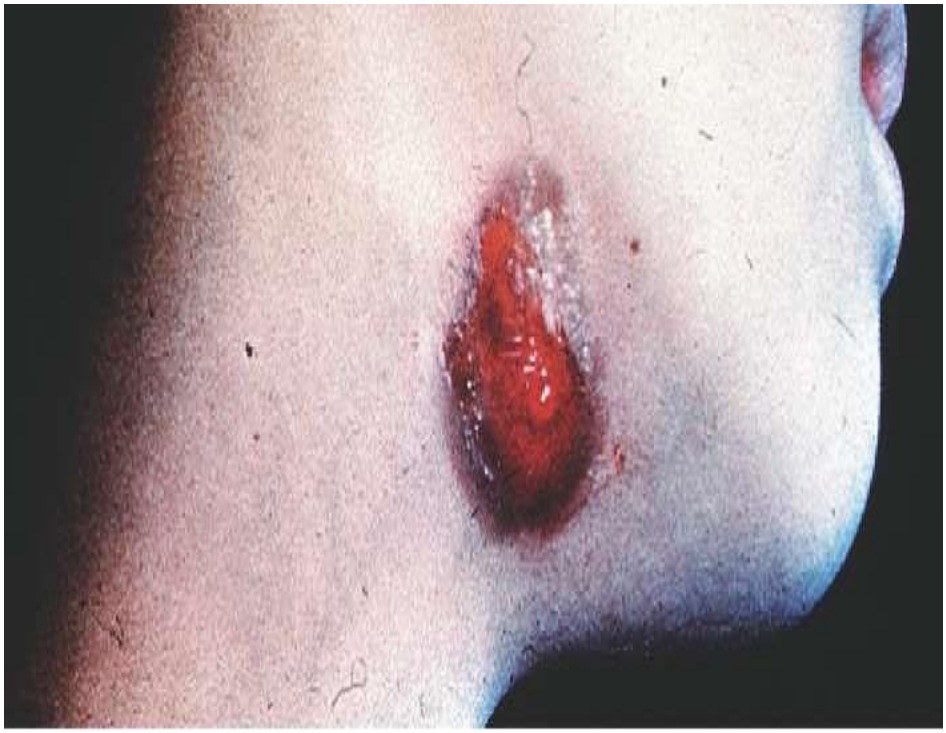


Fig. 28 Actinomycosis.

Eosinophilic clubs composed of immunoglobulin are seen at the periphery of the granule (Splendore- Hoeppli's phenomenon). They resemble rays; hence the name, ray fungus *(Actinomyces).* Gram stain demonstrates long Gram-positive filaments.

The crushed granule is used for inoculating cultures containing brain-heart infusion blood agar, incubated under anaerobic conditions at 37°C. Culture is difficult; therefore direct microscopy is important.

Penicillin G in large doses, 10-20 MU/day for 1 month, followed by 4-6 g/day of oral penicillin for another 2 months, may produce successful and lasting results.

Other effective medications have been ampicillin, erythromycin, tetracyclines, ceftriaxone, and clindamycin. Surgical incision, drainage, and excision of devitalized tissue are important.

Nocardiosis

Nocardiosis usually begins as a pulmonary infection from which dissemination occurs. Dissemination occurs most commonly in association with debilitating conditions, such as Hodgkin disease, periarteritis nodosa, leukemia, AIDS, organ transplants, or systemic lupus erythematosus. Skin involvement is seen in 10% of disseminated cases in the form of abscesses or vesiculopustular lesions (Fig. 29). Primary cutaneous disease also occurs in healthy individuals in the form of a draining abscess or lymphangitic nodules following a cutaneous injury.

Nocardia asteroides is usually responsible for the disseminated form of nocardiosis. *Nocardia brasiliensis* is the most common cause of primary cutaneous disease. A prick by a thorn or briar, other penetrating injury, or an insect bite or sting may be the inciting event. Nocardia are Gram-positive, partially acid-fast, aerobic, filamentous bacteria. Some are branched, but filaments tend to be shorter and more fragmentary than those of *Actinomyces.* The surrounding red layer of immunoglobulin tends to be smooth rather than club-shaped. On Sabouraud dextrose agar, without antibacterial additives, there are creamy or moist, white colonies, which later become chalky and orange-colored.

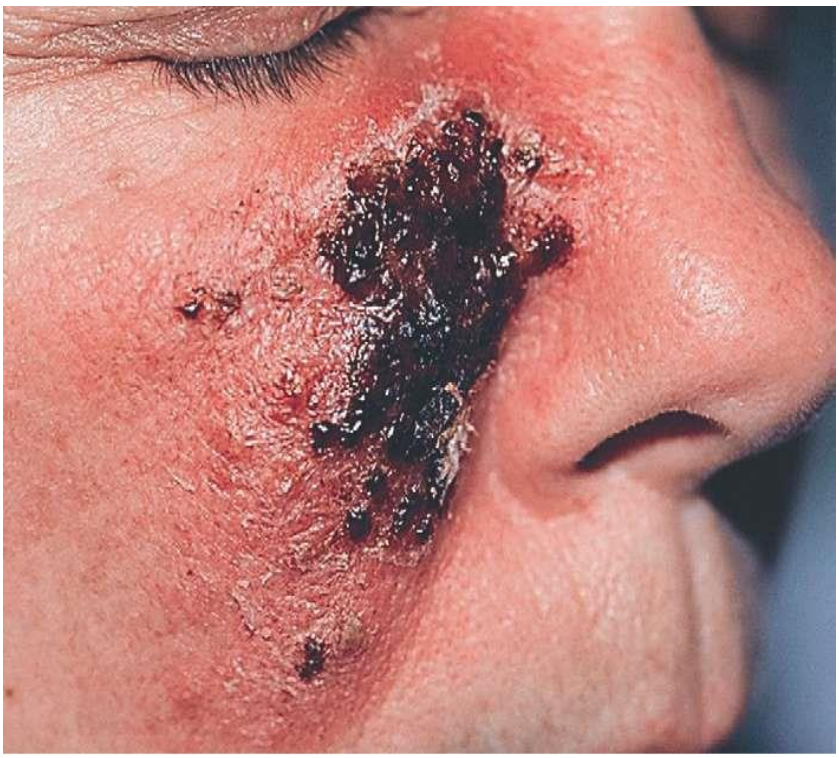


Fig. 29 Nocardiosis.

Trimethoprim-sulfamethoxazole (Bactrim, Septra), four tablets twice a day for 6-12 weeks, is the drug of first choice. Minocycline for *N. asteroides* and augmentin for *N. brasiliensis* are alternatives. Amikacin has been used in combination with a variety of other antibiotics. Synergism has been observed with amikacin in combination with cefotaxime, imipenem, or sparfloxacin.

INFECTIONS CAUSED BY GRAM-NEGATIVE ORGANISMS

Pseudomonas infections

Ecthyma gangrenosum

In the gravely ill patient opalescent, tense vesicles or pustules are surrounded by narrow pink to violaceous halos. These lesions quickly become hemorrhagic and violaceous, and rupture to become round ulcers with necrotic black centers (Fig. 30). They are usually on the buttocks and extremities, and are often grouped closely together.

Ecthyma gangrenosum occurs in debilitated persons who may be suffering from leukemia, in the severely burned patient, in pancytopenia or neutropenia, or in patients with a functional neutrophilic defect, terminal carcinoma, or other severe

chronic disease. Healthy infants may develop lesions in the perineal area after antibiotic therapy in conjunction with maceration of the diaper area.

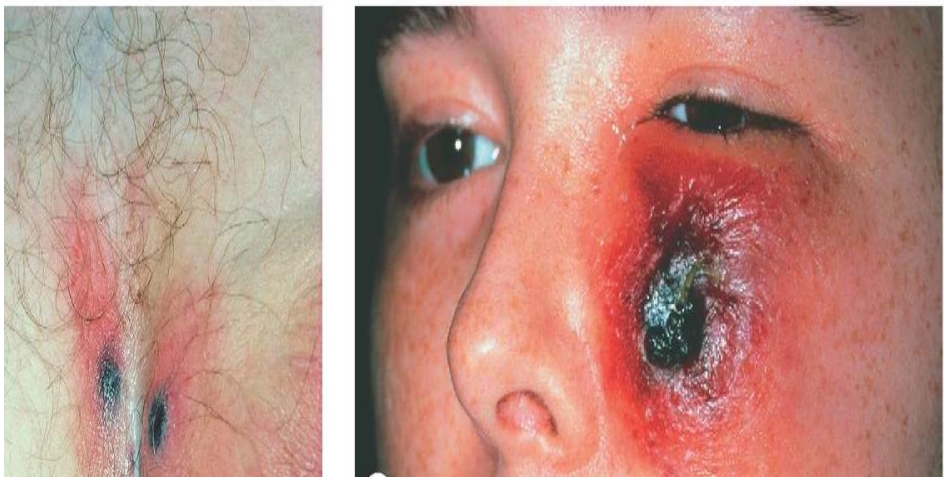


Fig. 30 A and B, Ecthyma gangrenosum

The classic vesicle suggests the diagnosis. The contents of the vesicles or hemorrhagic pustules will show Gram-negative bacilli on Gram stain and cultures will be positive for *P. aeru- ginosa.* As this is usually a manifestation of sepsis, the blood culture will show *P. aeruginosa.* However, in healthy infants with diaper-area lesions, in patients with HIV infection, and in other occasional cases, early lesions may occur at a portal of entry, allowing for diagnosis and treatment before evolution into sepsis occurs.

Recommended treatment is the immediate institution of intravenous antipseudomonal penicillin. The addition of granulocyte - macrophage colony-stimulating factor to stimulate both proliferation and differentiation of myeloid precursors is an adjunct in a patient with myelodysplasia or treatment-induced neutropenia. Patients have a poorer prognosis if there are multiple lesions, if there is a delay in diagnosis and institution of appropriate therapy, and if neutropenia does not resolve by the end of a course of antibiotics. Instrumentation or catheterization increases the risk of this infection.

Other lesions are also seen with *Pseudomonas* septicemia. These may be sharply demarcated areas of cellulitis, macules, papules, plaques, and nodules, characteristically found on the trunk. *Pseudomonas mesophilica*, *Burkholderia*

cepacia, Citrobacter freundii, and *Stenotrophomonas maltophilia* may also produce such skin lesions in immunocompromised individuals.

Several patients with AIDS have been reported who developed nodular skin lesions or abscesses secondary to *P. aerugi- nosa* Generally, these patients are systemically ill; however, blood cultures are negative.

Green nail syndrome

Green nail syndrome is characterized by onycholysis of the distal portion of the nail and a striking greenish discoloration in the separated areas (Fig. 31). It is frequently associated with paronychia in persons whose hands are often in water. Overgrowth of *P. aeruginosa* accounts for the pigment. Soaking the affected finger in a 1% acetic acid solution twice a day has been found to be helpful. Trimming the onycholytic nail plate followed by application of Neosporin solution twice a day is also effective. Green foot syndrome results from colonization of rubber sports shoes with *P. aeruginosa.* The organism produces pyoverdin, which stains the foot and toenails.

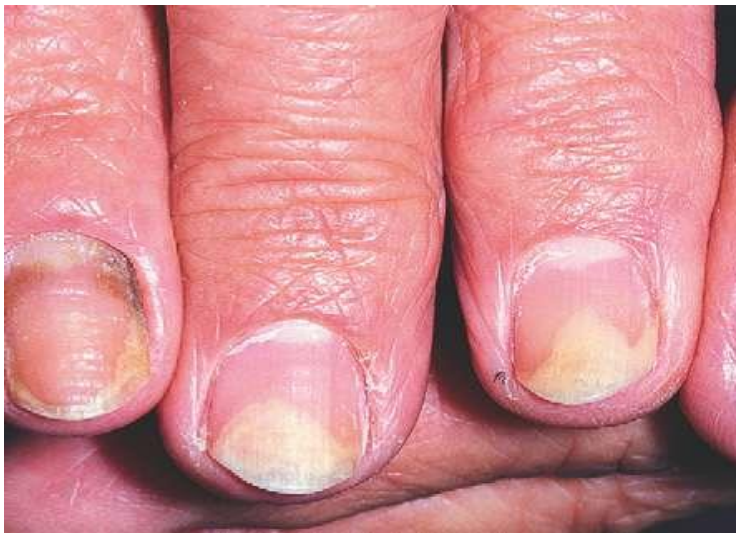


Fig. 31 Green nail syndrome complicating onycholysis.

Gram-negative toe web infection

This type of infection often begins with dermatophytosis. Dermatophytosis may progress with increasing inflammation, maceration, and inflammation to

dermatophytosis complex, where many types of Gram-negative organism may be recovered, but it is harder to culture dermatophytes. Finally, denudation with purulent or serous discharge and marked edema and erythema of the surrounding tissue may be seen (Fig. 32). Prolonged immersion may also cause hydration and maceration of the interdigital spaces, with overgrowth of Gram-negative organisms. *P. aeruginosa* is the most prominent among them, but commonly a mixture of other Gram-negative organisms, such as *E. coli* and *Proteus*, are present. Patients may suffer from red, painful nodules of the calf that do not drain, spontaneously involute, then reappear 1-2 weeks later. Culture of these subcutaneous abscesses will reveal *Pseudomonas* or other Gram-negatives, which are likely to originate in the macerated toe webs.

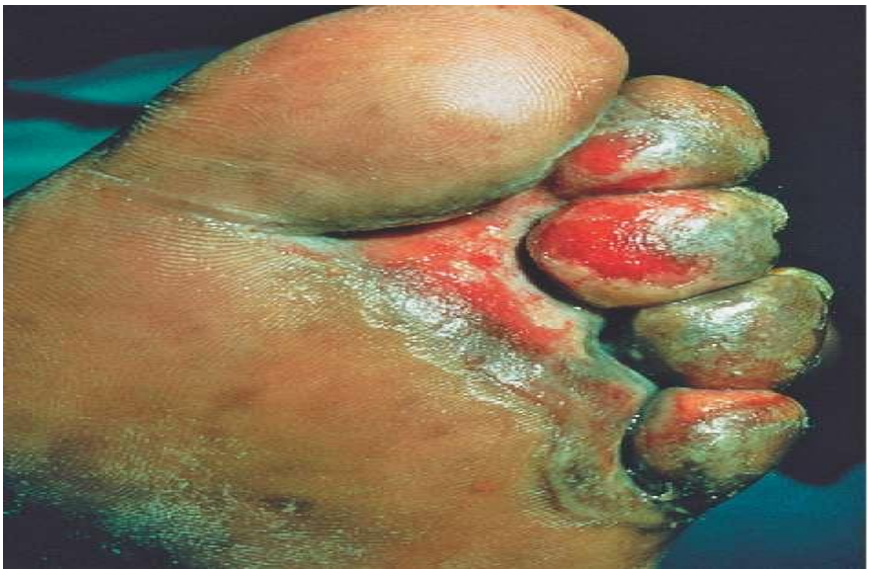


Fig. 32 Gram-negative toe web infection.

Early dermatophytosis, dermatophytosis simplex, may simply be treated with topical antifungals. However, once the scaling and peeling progress to white maceration, soggy scaling, bad odor, edema, and fissuring, treatment must also include topical antibiotics or acetic acid compresses. Drying of the interdigital spaces with a fan is a helpful adjunct. Fullblown Gram-negative toe web infection with widespread denudation and erythema, purulence, and edema requires systemic antibiotics. A third-generation cephalosporin or a fluoro- quinolone is recommended.

Pseudomonas aeruginosa folliculitis (hot tub folliculitis)

Pseudomonal folliculitis is characterized by pruritic follicular, maculopapular, vesicular, or pustular lesions occurring within 1-4 days after bathing in a hot tub, whirlpool, or public swimming pool (Fig. 33). As the water temperature rises, free chlorine levels fall, even though total chlorine levels appear adequate. This allows the bacteria to proliferate. Diving suits may become colonized and wearing them may result in *P. aeruginosa* folliculitis. Most lesions occur on the sides of the trunk, axillae, buttocks, and proximal extremities. The apo- crine areas of the breasts and axilla are often involved. Associated complaints may include earache, sore throat, headache, fever, and malaise. Rarely, systemic infection may result; breast abscess and bacteremia have been reported. Large community outbreaks have occurred associated with public pools, and 27 employees of a cardboard manufacturing facility who were exposed to wet work developed *Pseudomonas* folliculitis of the extremities as an occupational disorder.

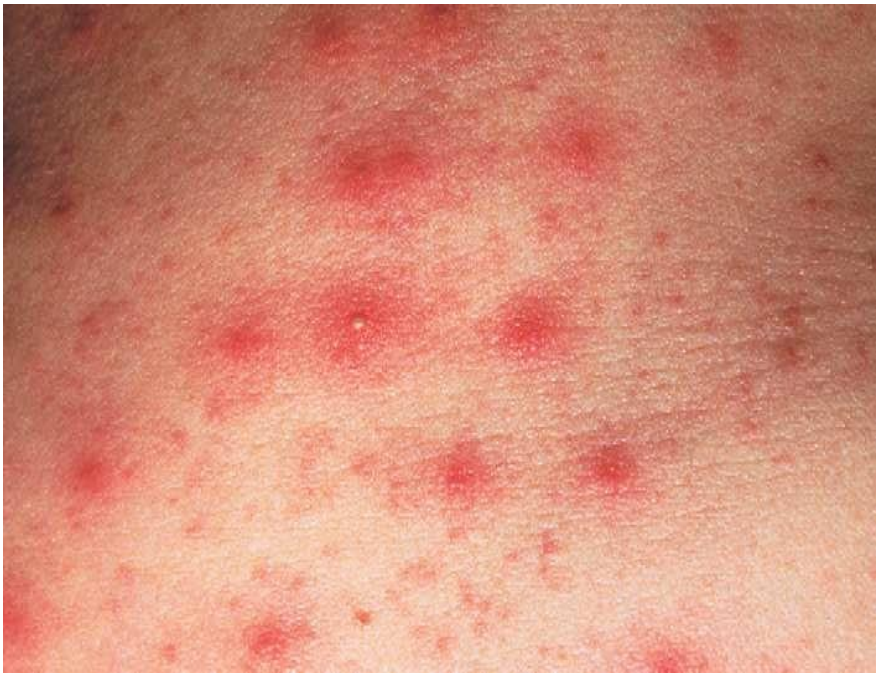


Fig. 14-33 *Pseudomonas* hot tub folliculitis.

The folliculitis involutes usually within 7-14 days without therapy, although on occasion multiple prolonged recurrent episodes have been reported. In patients with fever, constitutional symptoms, or prolonged disease, a third-generation oral cephalosporin or a fluoroquinolone such as ciprofloxacin or ofloxacin may be useful.

Preventive measures have been water filtration, automatic chlorination to maintain a free chlorine level of 1 ppm, maintenance of water at pH 7.2-7.8, and frequent changing of the water. Bromination of the water and ozone ionization are other options.

Pseudomonas hot-foot syndrome was reported in a group of 40 children who developed painful, erythematous plantar nodules or pustules after wading in a community pool whose floor was coated with abrasive grit. One biopsy showed neutrophilic eccrine hidradenitis and one dermal microabscesses. Most were treated symptomatically and resolution occurred within 2 weeks.

Blastomycosis-like pyoderma

Large verrucous plaques with elevated borders and multiple pustules may occur as a chronic vegetating infection. Most patients have an underlying systemic or local host compromise. Bacteria such as *P. aeruginosa, S. aureus*, *Proteus, E. coli*, or streptococci may be isolated.

Swelling, maceration, and pain may be present. In up to 70% of cases *P. aeruginosa* may be cultured. This is especially common in swimmers. Local applications of antipseudomonal and anti-inflammatory Cortisporin otic solution or suspension, or 2% acetic acid compresses with topical steroids, will help clear this infection. In patients with otorrhea or pus emanating from the canal, if the symptoms have been present for a week or more, or if diabetes or an immunologic defect is present, cleansing of the canal, visualizing the tympanic membrane for perforation, and other precautions will be most readily handled by an otolaryngology consultation.

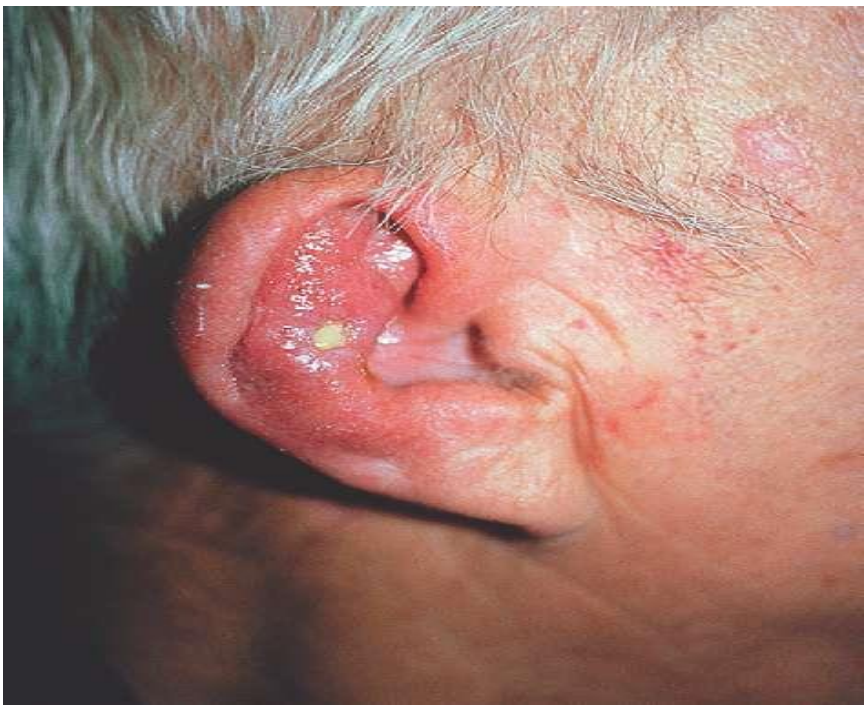


Fig. 14-34 *Pseudomonas* external otitis after shave biopsy.

Application of otic Domeboro solution after swimming will help prevent recurrence. Fungi such as *Candida* and *Aspergillus* are other causes. Antifungal solutions, such as ciclopiroxolamine solution, combined with steroid solutions are effective in oto- mycosis. There is also a threat of external otitis occurring after ear surgery (Fig. 14-34). If the patient is a swimmer or has diabetes, acetic acid compresses for a day or two before surgery may prevent this complication.

External otitis must be distinguished from allergic contact dermatitis due to neomycin in Cortisporin otic suspension. Allergic contact dermatitis produces severe pruritus, although tenderness may also be noted. Dermatitis may extend down the side of the cheek in a pattern suggesting drainage of the suspension.

A severe type, referred to as malignant external otitis, occurs in elderly patients with diabetes or in those immunocompro- mised with HIV infection, on chemotherapy, or living with organ transplants. The swelling, pain, and erythema are more pronounced, with purulence and a foul odor. Facial nerve palsy develops in 30% of cases, and cartilage necrosis may occur. This is a life-threatening infection in these older, compromised individuals, and requires swift institution and prolonged administration (4-6 weeks) of oral quinolone antibiotics.

Finally, commercial ear piercing of the upper ear cartilage may lead to infection with *Pseudomonas,* with resulting cosmetic deformity a reported complication.

Gram-negative folliculitis

Although this is usually due to Enterobacteriaceae, *Klebsiella, Escherichia, Proteus,* or *Serratia,* occasional cases caused by *Pseudomonas* have been seen. They differ from Gram-negative infection in patients with acne in that the site of *Pseudomonas* colonization is the external ear, and topical therapy alone to the face and ears is sufficient for cure. Finally, an outbreak of Gram-negative pustular dermatitis on the legs, arms, torso, and buttocks occurred in a group of college students who hosted a mud-wrestling social event.

Malacoplakia (malakoplakia)

This rare granuloma, originally reported only in the genitourinary tract of immunosuppressed renal transplant recipients, may also occur in the skin and subcutaneous tissues of other patients with deficient immune responsiveness such as is present in HIV infection. Patients are unable to resist infections with S. *aureus, P. aeruginosa,* and *E. coli.* There is defective intracellular digestion of the bacteria once they have been phagocytosed.

The granulomas may arise as masslike lesions or nodules, abscesses or ulcerations. They favor the perineum, but also affect the abdominal wall, thorax, extremities, and axilla. The tongue is also a site of appearance, usually presenting as a mass lesion. Histologically, there are foamy eosinophilic Hansemann macrophages containing calcified, concentrically laminated, intracytoplasmic bodies called Michaelis-Gutmann bodies. Scattered immunoblasts, neutrophils, and lymphocytes are found in the dermis.

Successful treatment depends on the isolated organism; a fluoroquinolone such as ciprofloxacin or ofloxacin is usually useful.

Haemophilus influenzae cellulitis

Haemophilus influenzae type B causes a distinctive bluish or purplish-red cellulitis of the face accompanied by fever in children younger than age 2. The condition is rarely seen in countries where the vaccination is available. It is given at 2, 4, and 6 months of age. The importance of recognizing the entity is related to the bacteremia that often accompanies the celluli- tis. The bacteremia may lead to meningitis, orbital cellulitis, osteomyelitis, or pyarthrosis. Cultures of the blood and needle aspirates of the cellulitis should yield the organism. Cefotaxime or ceftriaxone is effective. In a family with children under the age of 4, the index case, both parents, and children at risk (unvaccinated) should be given rifampin to clear the nasal carriage state and prevent secondary cases.

Chancroid

Chancroid (soft chancre) is an infectious, ulcerative STD caused by the Gram-negative bacillus *Haemophilus ducreyi* (the Ducrey bacillus). One or more deep or superficial tender ulcers on the genitalia, and painful inguinal adenitis in 50%, which may suppurate, are characteristic of the disease. Men outnumber women manyfold.

Chancroid begins as an inflammatory macule or pustule 1-5 days—or rarely as long as 2 weeks—after intercourse. It generally appears on the distal penis or perianal area in men, or on the vulva, cervix, or perianal area in women. However, many cases of extragenital infection on the hands, eyelids, lips, or breasts have been reported. Autoinoculation frequently forms kissing lesions on the genitalia, and women are apt to have more numerous lesions. The pustule ruptures early with the formation of a ragged ulcer that lacks the induration of a chancre, usually being soft with an indefinite inflammatory thickening. The ulcers appear punched out or have undermined irregular edges surrounded by mild hyperemia (Fig. 35). The base is covered with a purulent, dirty exudate. The ulcers bleed easily and are very tender. As a result of mixed infection, phagedenic and gangrenous features may develop. Chronic, painful, destructive ulcers, which begin on the prepuce or glans and spread by direct extension along the shaft of the penis, are present. They may sometimes attack the scrotum or pubes.

The edges of the ulcer are likely to be elevated, firm, and undermined. The granulating base, which bleeds easily, is covered with a thick, purulent exudate and dirty, necrotic detritus. The neighboring skin may be edematous and dusky red, and the regional lymph glands may be swollen, although this is not necessarily a marked feature. There is severe mutilation as a result of sloughing, without any evidence of spontaneous healing.

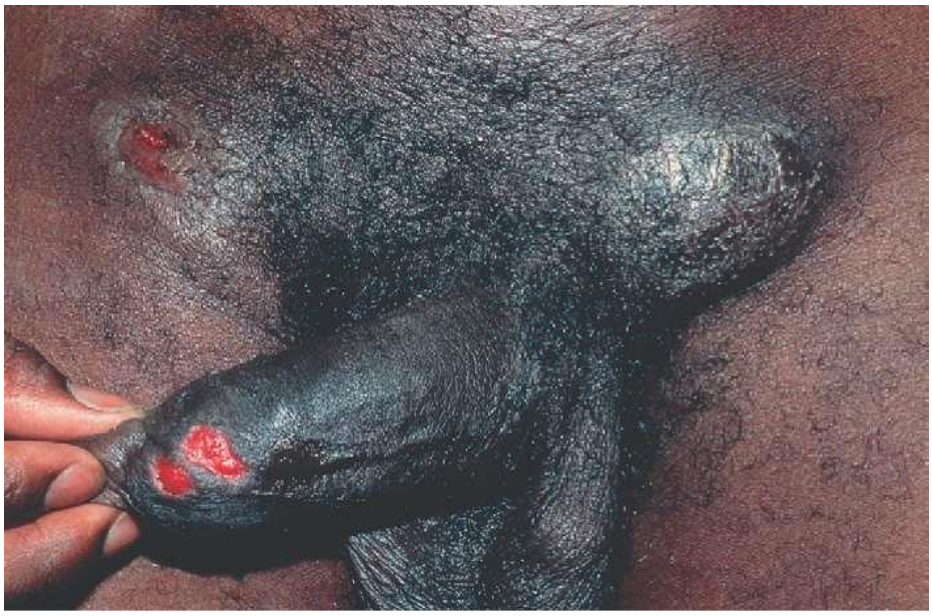


Fig. 35 Chancroid.

This type of phagedena (spreading and sloughing ulcera- tion) is a rare complication of chancre and chancroidal infections together with another secondary bacterial infection. Treatment is by the use of antibiotics locally and internally, directed against secondary bacteria, as well as the primary process. Multiple infections may be present, such as chancroid, syphilis, or granuloma inguinale.

On histologic investigation the ulcer may include a superficial necrotic zone with an infiltrate consisting of neutrophils, lymphocytes, and red blood cells. Deep to this, new vessel formation is present, with vascular proliferation. Deeper still is an infiltrate of lymphocytes and plasma cells. Ducrey bacilli may or may not be seen in the sections.

The definitive diagnosis of chancroid requires identification by culture. Solid-media culture techniques have made definitive diagnosis possible, and permit sensitivity testing; however, culture is unavailable in many settings and recovery is

only about 80% successful. Specimens for culture should be taken from the purulent ulcer base and active border without extensive cleaning. They should be inoculated in the clinic, as transport systems have not been evaluated. The selective medium contains vancomycin, and cultures are done in a water- saturated environment with 1-5% CO_2, at a temperature of 33°C. Occasional outbreaks are due to vancomycin-sensitive strains. In these cases, culture will only be successful using vancomycin-free media.

Smears are only diagnostic in 50% of cases in the best hands. A probable diagnosis is made by a clinically compatible examination and negative testing for those conditions whose presentation may mimic chanchroid. Probably the disease for which chancroid is most frequently mistaken is herpes pro- genitalis. A history of recurrent grouped vesicles at the same site should help eliminate the chance of a misdiagnosis. Traumatic ulcerations should also be ruled out. These occur mostly along the frenulum or as multiple erosions on the prepuce. Adenopathy is absent and some degree of phimosis is present.

The clinical features that differentiate chancroid from syphilitic chancre are described in Chapter 18. However, the diagnosis of chancroid does not rule out syphilis. Either the lesion may already be a mixed sore or the subsequent development of syphilis should be anticipated, since the incubation period of the chancre is much longer than that of chancroid. Repeated darkfield examinations for *Treponema pallidum* are necessary, even in a sore where the diagnosis of chancroid has been established. Serologic tests for syphilis should be obtained initially, and monthly for the next 3 months, and serologic testing for HIV infection should also be done. Chancroidal genital ulcer disease facilitates the transmission of HIV infection. In HIV-infected patients, chanchroid may have a prolonged incubation period, the number of ulcers may be increased, extragenital sites are more frequently affected, antibiotic therapy fails more often, and healing is slower when it does occur. Complications such as penile amputation from a deep transverse ulcer may result.

Treatment

The treatment of choice for chancroid is azithromycin, 1 g orally in a single dose. Erythromycin, 500 mg four times a day for 7 days; ceftriaxone, 250 mg intramuscularly in a single dose; and ciprofloxacin, 500 mg orally twice a day for 3 days, are also recommended treatments. Ciprofloxacin should not be used in pregnant or lactating women, or in children younger than 17 years of age. Partners who have had sexual contact with the patient within the 10 days before the onset of symptoms should be treated with a recommended regimen.

Phimosis that does not subside following irrigation of the preputial cavity may have to be relieved by a dorsal slit. Circumcision should be deferred for at least 2 or 3 months. If frank pus is already present, repeated aspirations (not incisions) may be necessary.

Granuloma inguinale (granuloma venereum, donovanosis)

Granuloma inguinale is a mildly contagious, chronic, granulomatous, locally destructive disease characterized by progressive, indolent, serpiginous ulcerations of the groins, pubes, genitalia, and anus.

The disease begins as single or multiple subcutaneous nodules, which erode through the skin to produce clean, sharply defined lesions, which are usually painless. More than 80% of cases demonstrate hypertrophic, vegetative granulation tissue, which is soft, has a beefyred appearance, and bleeds readily (Fig. 36A). Approximately 10% of cases have ulcerative lesions with overhanging edges and a dry or moist floor (Fig. 36B). A membranous exudate may cover the floor of fine granulations, and the lesions are moderately painful. Occasional cases are misdiagnosed as carcinoma of the penis. The lesions enlarge by autoinoculation and peripheral extension with satellite lesions, and by gradual undermining of tissue at the advancing edge.

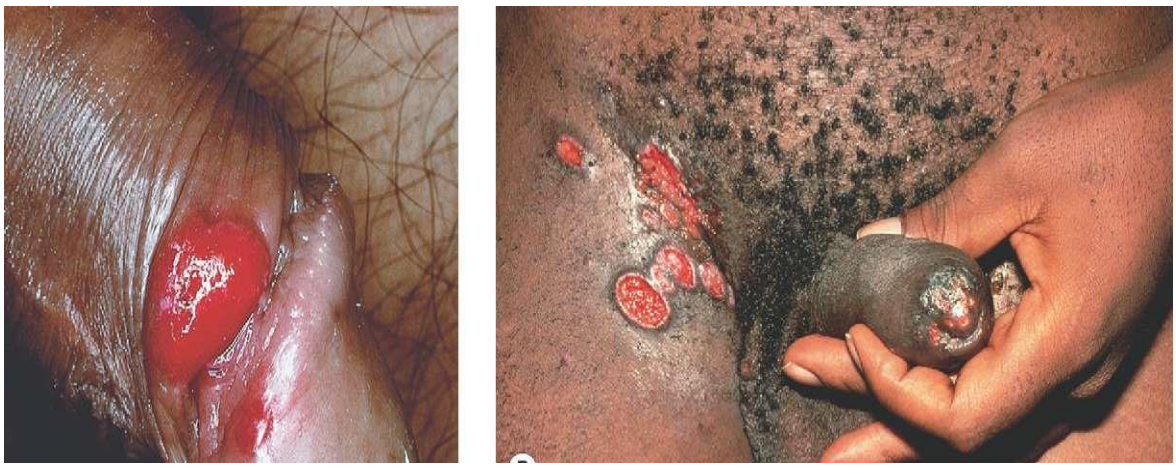


Fig. 36 Granuloma inguinale

The genitalia are involved in 90% of cases, inguinal region in 10%, anal region in 5-10%, and distal sites in 1-5%. Lesions are limited to the genitalia in approximately 80% of cases and to the inguinal region in less than 5%. In men, the lesions most commonly occur on the prepuce or glans, and in women, lesions on the labia are most common.

The incubation period is unknown; it may vary between 8 and 80 days, with a 2- to 3-week period being most common.

Persisting sinuses and hypertrophic scars, devoid of pigment, are fairly characteristic of the disease. The regional lymph nodes are usually not enlarged. In later stages, as a result of cicatrization, the lymph channels are sometimes blocked and pseudoelephantiasis of the genitals (esthiomene) may occur. Mutilation of the genitals and destruction of deeper tissues are observed in some instances.

Dissemination from the inguinal region may be by hematog- enous or lymphatic routes. There may be involvement of liver, other organs, eyes, face, lips, larynx, chest, and, rarely, bones. During childbearing the cervical lesions may extend to the internal genital organs. Squamous cell carcinoma may rarely supervene.

Granuloma inguinale is caused by the Gram-negative bacterium *Klebsiella granulomatis.* It is sexually transmitted in the majority of cases with the occurrence of conjugal infection in 12-52% of marital or steady sexual partners. Also, it is speculated that *K. granulomatis* is an intestinal inhabitant that leads to granuloma inguinale through auto- inoculation, or sexually through vaginal intercourse if the vagina is contaminated by enteric bacteria, or through rectal intercourse, heterosexual

or homosexual. *K. granulomatis* probably requires direct inoculation through a break in the skin or mucosa to cause infection. Those affected are generally young adults.

On histologic investigation, in the center of the lesion, the epidermis is replaced by serum, fibrin, and polymorpho- nuclear leukocytes. At the periphery the epidermis demonstrates pseudoepitheliomatus hyperplasia. In the dermis there is a dense granulomatous infiltration composed chiefly of plasma cells and histiocytes, and scattered throughout are small abscesses containing polymorphonuclear leukocytes.

Characteristic pale-staining macrophages that have intra- cytoplasmic inclusion bodies are found. The parasitized histio- cytes may measure 20 |m or more in diameter. The ovoid Donovan bodies measure 1-2 |m and may be visualized by using Giemsa or silver stains. The best method, however, is toluidine blue staining of semi-thin, plastic-embedded sections. Crushed smears of fresh biopsy material stained with Wright or Giemsa stain permit the demonstration of Donovan bodies and provide rapid diagnosis.

Granuloma inguinale may be confused with ulcerations of the groin caused by syphilis or carcinoma, but it is differentiated from these diseases by its long duration and slow course, by the absence of lymphatic involvement, and, in the case of syphilis, by a negative test for syphilis and failure to respond to antisyphilitic treatment.

It should not be overlooked that other venereal diseases, especially syphilis, often coexist with granuloma inguinale. Additionally, all patients presenting with STDs should be tested for HIV infection and their sexual partners evaluated. Lymphogranuloma venereum at an early stage would most likely be accompanied by inguinal adenitis. In later stages, when stasis, excoriations, and enlargement of the outer genitalia are common to granuloma inguinale and lymphogranuloma venereum, the absence of a positive lymphogranuloma venereum complement-fixation test and the presence of Donovan bodies in the lesions permit the diagnosis of granuloma inguinale.

Treatment

Trimethoprim-sulfamethoxazole, one double-strength tablet orally twice a day for a minimum of 3 weeks, or doxycycline, 100 mg orally twice a day for a minimum of 3 weeks, is the recommended regimen. Therapy should be continued until all lesions have healed completely. Alternative regimens are cip- rofloxacin, 750 mg orally twice a day for a minimum of 3 weeks; erythromycin base, 500 mg orally four times a day for a minimum of 3 weeks, or azithromycin, 1 g orally once a week for at least 3 weeks, is also effective. The addition of an aminoglycoside (gentamicin), 1 mg/kg intravenously every 8 h, should be considered if lesions do no respond within the first few days and in HIV-infected patients.

Gonococcal dermatitis

Primary gonococcal dermatitis is a rare infection that occurs after primary inoculation of the skin from an infected focus. It may present as grouped pustules on an erythematous base on the finger, simulating herpetic whitlow, with or without an ascending lymphangitis. Scalp abscesses in infants may occur secondary to direct fetal monitoring in mothers with gonorrhea. It may also cause an inflammation of the median raphe or a lymphangitis of the penis with or without accompanying urethritis. Treatment is the same as that of gonorrheal urethri- tis. A single oral dose of cefixime, 400 mg, is usually curative. Ceftriaxone is also effective as a 125 mg single intramuscular dose.

Gonococcemia

Gonococcemia is characterized by a hemorrhagic vesiculopus- tular eruption, bouts of fever, and arthralgia or actual arthritis of one or several joints. The skin lesions begin as tiny ery- thematous macules that evolve into vesicopustules on a deeply erythematous or hemorrhagic base or into purpuric macules that may be as much as 2 cm in diameter (Fig. 37). These purpuric lesions occur acrally, mostly on the palms and soles, and over joints. They are accompanied by fever, chills, malaise, migratory polyarthralgia, myalgia, and tenosynovitis. The ves- icopustules are usually tender and sparse, and occur principally on the extremities. Involution of the lesions takes place in about 4 days. Many patients are women with asymptomatic

anogenital infections in whom dissemination occurs during pregnancy or menstruation. Liver function abnormalities, myocarditis, pericarditis, endocarditis, and meningitis may complicate this infection. In severe or recurrent cases complement deficiency, especially of the late (C5, C6, C7, or C8) components, should be investigated.

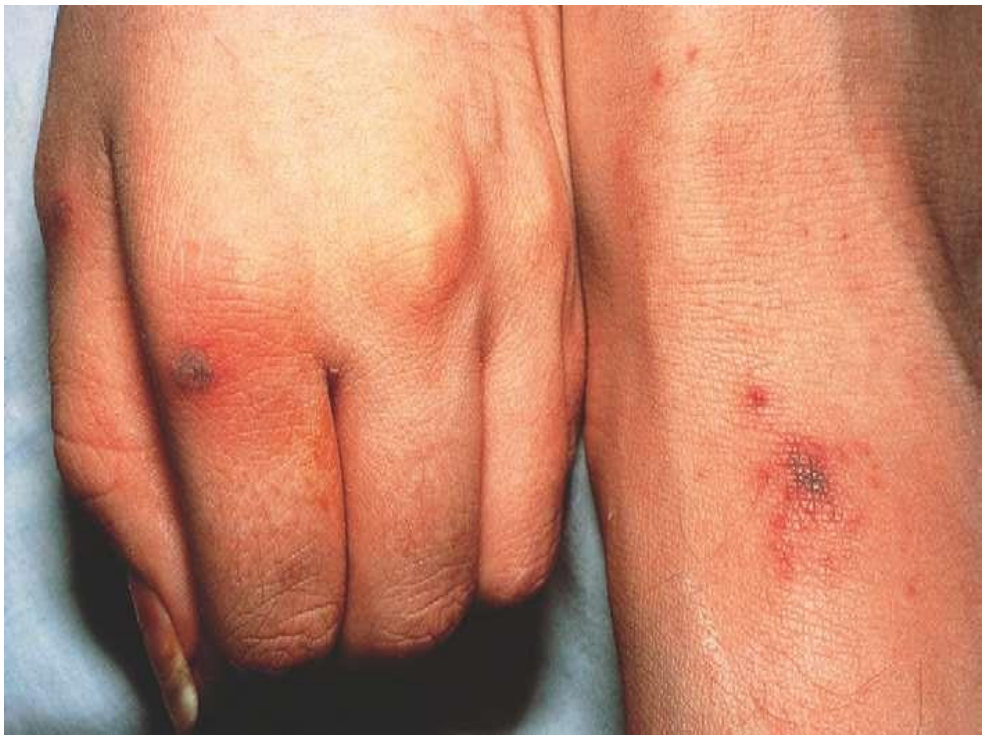


Fig. 37 Gonococcemia.

The causative organism is *Neisseria gonorrhoeae*. These organisms can at times be demonstrated in the early skin lesion histologically, by smears, and by cultures. Gonococci may be found in the blood, genitourinary tract, pharynx, joints, and skin.

The skin lesions of gonococcemia may be identical to those seen in meningococcemia, nongonococcal bacterial endocarditis, rheumatoid arthritis, the rickettsial diseases, systemic lupus erythematosus, periarteritis nodosa, Haverhill fever, and typhoid fever. Septic emboli with any Gram-negative organism or *Candida* classically manifest as hemorrhagic pustules.

The treatment of choice for disseminated gonococcal infection is ceftriaxone, 1 g/day intravenously or intramuscularly for 24-48 h after improvement begins. Then

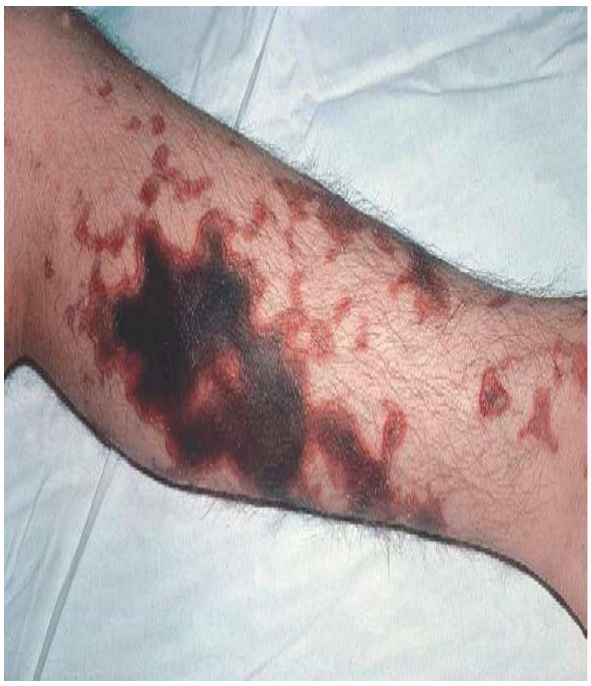
therapy may be switched to cefixime, 400 mg orally twice a day, for at least 1 week. Alternative initial drugs include cefotaxime, 1 g every 8 h, or ceftizoxime, 1 g every 8 h. Spectinomycin, 2 g intramuscularly every 12 h, may be used for persons allergic to P-lactam drugs.

If a cephalosporin is used, either doxycycline, 100 mg twice a day for 7 days, or azithromycin, 1 g as a single dose, should be given to treat coexisting chlamydial infection. Serologic testing for HIV infection should also be done, as well as screening for syphilis. Sex partners within 30 days for symptomatic infection and 60 days for asymptomatic infection should be referred for treatment.

Meningococcemia

Acute meningococcemia presents with fever, chills, hypotension, and meningitis. Half to two-thirds of patients develop a petechial eruption, most frequently on the trunk and lower extremities, which may progress to ecchymoses, bullous hem- orrhagic lesions, and ischemic necrosis (Fig. 38). Often acral petechiae are present, and petechiae may be noted on the eyelids. Angular infarctive lesions with an erythematous rim and gun-metal gray interior are characteristic of meningococcal sepsis. Occasionally, a transient, blanchable, morbilliform eruption is the only cutaneous finding. The oral and conjunctival mucous membranes may be affected.

Meningococcemia primarily affects young children, males more frequently than females. Patients with asplenia, immu- noglobulin deficiencies, or inherited or acquired deficiencies of the terminal components of complement or properdin are predisposed to infection.



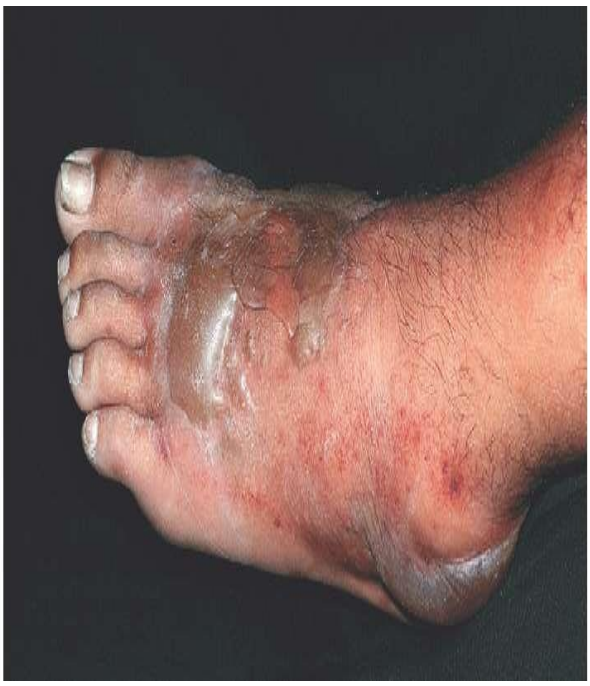


Fig. 38 Meningococcemia. **Fig. 39** Vibrio vulnificus infection.

A rare variant is chronic meningococcemia. There are recurrent episodes of fever, arthralgias, and erythematous macules that may evolve into lesions with central hemorrhage. Acral hemorrhagic pustules, similar to those found in gonococcal sepsis, may be seen. Patients are generally young adults with fevers lasting 12 h interspersed with 1-4 days of well-being.

The disease is caused by the fastidious Gram-negative diplo- coccus *Neisseria meningitidis.* It has a polysaccharide capsule that is important in its virulence and serotyping. The human nasopharynx is the only known reservoir, with carriage rates in the general population estimated to be 5-10%.

Treatment is with penicillin G, 300 000 U/kg/day intravenously up to 24 MU/day for 10-14 days. Cefotaxime, ceftriaxone, chloramphenicol, and trimethoprim-sulfamethoxazole are alternatives. One dose of ciprofloxacin, 500 mg, is given after the initial course of antibiotics to clear nasal carriage. Household members and daycare and close school contacts should receive prophylactic therapy. Rifampin, 10 mg/kg every 12 h for 2 days, is an alternative for children. A poly-valent vaccine is effective against groups A, C, Y, and W-135, and is recommended for high-risk groups.

Vibrio vulnificus infection

Infection with *Vibrio vulnificus,* a Gram-negative rod of the non-cholera group of vibrios, may produce both a rapidly expanding cellulitis or a life-threatening septicemia in patients who have been exposed to the organism. This infection mainly occurs along the Atlantic seacoast. It may be acquired via the gastrointestinal tract, where, after being ingested with raw oysters or other seafood, the bacterium enters the bloodstream at the level of the duodenum. Pulmonary infection by the aspiration of seawater has been reported. Localized skin infection may result after exposure of an open wound to seawater.

Skin lesions characteristically begin within 24-48 h of exposure, with localized tenderness followed by erythema, edema, and indurated plaques. They occur in nearly 90% of patients and are most common on the lower extremities. A purplish discoloration develops centrally and then undergoes necrosis, forming hemorrhagic bullae or ulcers (Fig. 39). Other reported lesions include hemorrhagic bullae, pustules, petechiae, generalized macules or papules, and gangrene.

If the skin is invaded primarily, septicemia may not develop, but the lesions may be progressive and at times limb amputation may be necessary. With septicemia, cellulitic lesions are the result of seeding of the subcutaneous tissue during bacter- emia. Patients with advanced liver disease are at particular risk for developing septicemia. Other predisposing disorders are immunosuppression, alcoholism, adrenal insufficiency, diabetes, renal failure, male sex, and iron-overload states. The virulence of the bacterium is related to the production of exo- toxin and various other factors. The mortality in patients with septicemia is greater than 50%.

Treatment of this fulminant infection, which rapidly produces septic shock, includes antibiotics, surgical debridement, and appropriate resuscitative therapy. Doxycycline together with ceftazidime is the treatment of choice. In patients with preexisting hepatic dysfunction or immunocompromise and whose wounds are exposed to or acquired in saltwater, prophylactic antibiotic coverage with doxycycline, 100 mg every 12 h, and cleansing with 0.025% sodium hypochlorite solution may prevent progressive infection.

Chromobacteriosis and *Aeromonas* infections

Chromobacteria are a genus of Gram-negative rods that produce various discolorations on gelatin broth. They have been shown to be common water and soil saprophytes of the southeastern US and Australia. Several types of cutaneous lesions are caused by chromobacteria, ranging from fluctuating abscesses and local cellulitis to anthrax-like carbuncular lesions with lymphangitis and fatal septicemia. *Chromobacterium violaceum,* the most common organism in this genus, produces a violet pigment. Patients with chronic granulomatous disease may be at particular risk. Systemic aminoglycosides are indicated.

A Gram-negative bacterium, *Aeromonas hydrophilia,* another typical soil and water saprophyte, may cause similar skin infections manifesting as cellulitis, pustules, furuncles, gas gangrene, or ecthyma gangrenosum-like lesions, after water-related trauma and abrasions. Folliculitis caused by *Aeromonas hydrophilia* may mimic *Pseudomonas folliculitis.* The treatment of choice is ciprofloxacin.

Salmonellosis

Salmonellae are a genus of Gram-negative rods that exist in humans either in a carrier state or as a cause of active enteric or systemic infection. Most cases of typhoid fever caused by *Salmonella typhi* are acquired by ingestion of contaminated food or water. Pets such as lizards, snakes, and turtles carry *Salmonella* organisms and acquisition of the organism in petting zoos has also been reported. Poultry and poultry products are the most important sources and are believed to be the cause in about half of common-source epidemics. Hand washing and thorough cooking of meats are recommended preventative measures.

After an incubation period of 1-2 weeks, there is usually an acute onset of fever, chills, headache, constipation, and bronchitis. After 7-10 days of fever and diarrhea, skin lesions, rose- colored macules or papules ("rose spots") 2-5 mm in diameter, appear on the anterior trunk, between the umbilicus and nipples. They occur in crops, each group of 10-20 lesions lasting 3-4 days, the total duration of the exanthem being 2-3 weeks in untreated cases. Rose spots occur in 50-60% of cases. A more extensive erythematous eruption occurring early in the course, erythema

typhosum, is rarely reported, as are erythema nodosum, urticaria, and ulcers or subcutaneous abscesses.

The diagnosis is confirmed by culturing the organism from blood, stool, skin, or bone marrow. If the organism is not grown on *Shigella-Salmonella* medium, or not analyzed correctly, it may be erroneously reported as a coliform. The preferred antibiotics are either ciprofloxacin or ceftriaxone.

Occasionally, *S. typhi* may cause skin lesions without systemic infection. Also, infection with non-typhoid *Salmonella*, such as *S. enterica*, may cause enteric fever with rose spots.

Shigellosis

Shigellae are small Gram-negative rods that cause bacillary dysentery, an acute diarrheal illness. Most cases are a result of person-to-person transmission; however, widespread epidemics have resulted from contaminated food and water. Small, blanchable, erythematous macules on the extremities, as well as petechial or morbilliform eruptions, may occur. Stoll reported a man who had sex with men who developed a 1 cm furuncle on the dorsal penile shaft from which a pure culture of *Shigella flexneri* was grown. Shigellosis may then occur as a purely cutaneous form of STD. *Shigella* and *Salmonella* are among the organisms reported to induce the postdysenteric form of Reiter syndrome. Therapy with a fluoroquinolone is curative.

Helicobacter cellulitis

Fever, bacteremia, cellulitis, and arthritis may all be caused by *Helicobacter cinaedi* or *canis.* Generally, these manifestations occur in HIV-infected patients; however, malignancy, diabetes, and alcoholism are other predisposing conditions. Occasionally, *Helicobacter* has been reported to cause postsur- gical wound infections and sepsis in otherwise healthy individuals. The cellulitis may be multifocal and recurrent, and have a distinctive red-brown or copper color with minimal warmth. Ciprofloxacin is generally effective.

Rhinoscleroma

Rhinoscleroma is a chronic, inflammatory, granulomatous disease of the upper respiratory tract characterized by sclerosis, deformity, remission, and eventual debility. Death resulting from obstructive sequelae may occur. The infection is limited to the nose, pharynx, and adjacent structures.

The disease begins insidiously with nasal catarrh, increased nasal secretion, and subsequent crusting. Gradually, there ensues a nodular or rather diffuse sclerotic enlargement of the nose, upper lip, palate, or neighboring structures (Fig. 40).

The nodules at first are small, hard, subepidermal, and freely movable, but they gradually fuse to form sclerotic plaques that adhere to the underlying parts. Ulceration is common.

The lesions have a distinctive stony hardness, are insensitive, and are of a dusky purple or ivory color. Hyperpigmentation can be expected in dark-complexioned individuals.

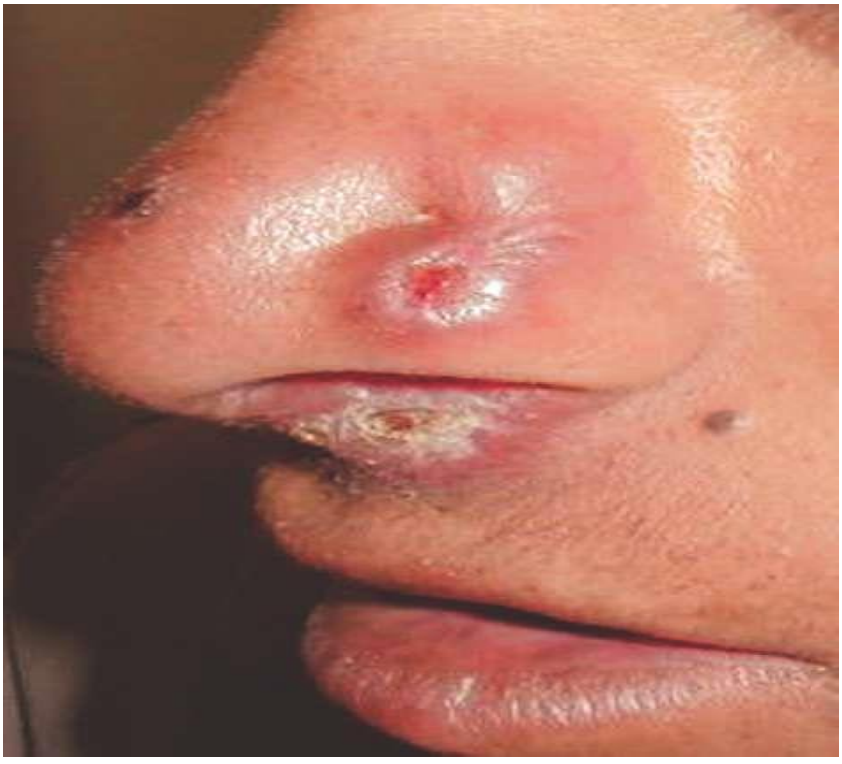


Fig. 40 Rhinoscleroma.

In the more advanced stages of rhinoscleroma, the reactive growth produces extensive mutilation of the face and marked disfigurement. Complete obstruction of the nares, superficial erosions, and seropurulent exudation may occur.

A microorganism, *Klebsiella pneumoniae,* ssp. *rhinoscleromatis,* first isolated by von Frisch, is the causative agent. The rhino- scleroma bacillus is a Gram-negative rod, short, nonmotile, round at the ends, always encapsulated in a gelatinous capsule, and measuring 2-3 m. It is found in the throats of scleroma patients only.

The disease occurs in both sexes, and is most common during the third and fourth decades of life. Although endemic in Austria and southern Russia, and occasionally found in Brazil, Argentina, Chile, Spain, Italy, Sweden, and the US, it is especially prevalent in El Salvador, where many workers in the dye industry have been affected. Rare familial cases have been reported; when this occurs, the condition may present in childhood.

In the primary stage of nasal catarrh, the histologic picture is that of a mild, nonspecific inflammation. When proliferation and tumefaction develop, the granulomatous tumor is made up largely of plasma cells, Mikulicz cells, an occasional hyaline degenerated plasma cell (Russell body), a few spindle cells, and fibrosis. The bacilli are found within foamy macrophages (Mikulicz cells). They are best visualized with the Warthin- Starry silver stain.

Rhinoscleroma has such distinctive features that its diagnosis should not be difficult. The diagnosis depends on bacterio- logic, histopathologic, and serologic tests. Heat-killed antigen gives a positive complement-fixation reaction with scleroma patients' serum. Titers run as high as 1 : 1280. Clinically, it can be confused with syphilitic gumma, sarcoid, leishmaniasis, frambesia, keloid, lepra, hypertrophic forms of tuberculosis, and rhinosporidiosis.

Treatment

This disease is usually progressive and resistant to therapy; however, it may respond well to the fluoroquinolones, but therapy should be prolonged, lasting at least 3 or 4 months to try to limit the chance of relapse. Corticosteroids are useful in

the acute phase. Surgical intervention or CO_2 laser treatments may be needed to prevent airway obstruction or to correct deformities.

Pasteurellosis

Primary cutaneous (ulceroglandular) *Pasteurella hemolytica* infection may occur in patients with skin injury and exposure to this organism. *P. hemolytica* is a common pathogen of domestic animals, being associated with shipping fever in cattle and septicemia in lambs and newborn pigs. The lacerations become inflamed, lymphangitis and fever develop, and axillary lymph nodes become enlarged. Diagnosis is based on demonstration of the bacteria on culture of the lesions.

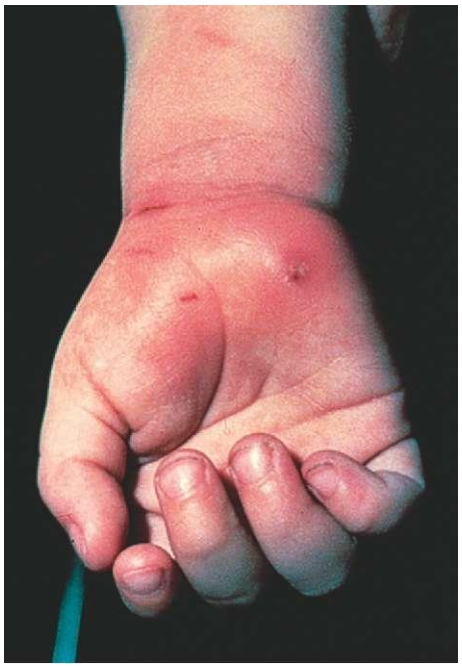


Fig. 41 Pasteurella multocida infection.

Pasteurella multocida is a small, nonmotile, Gram-negative, bipolar-staining bacterium. It is known to be part of the normal oral and nasal flora of cats and dogs, but may also be an animal pathogen. The most common type of human infection follows injuries from animal bites, principally cat and dog bites, but also cat scratches. Following animal trauma, erythema, swelling, pain, and tenderness develop within a few hours of the bite, with a gray-colored serous or sanguinopurulent drainage from the puncture wounds (Fig. 41). There may or may

not be regional lymphadenopathy or evidence of systemic toxicity such as chills and fever.

Septicemia may follow the local infection in rare cases, and tenosynovitis and osteomyelitis appear with some frequency. Though a Gram-negative bacillus, treatment is with systemic penicillin G in addition to careful cleansing and tetanus prophylaxis.

Dog and human bite pathogens

It is recommended that all cat bites and scratches, all sutured wounds of any animal source, and any other animal injuries of an unusual type or source be treated with antibiotics in addition to careful cleansing and tetanus prophylaxis. While *Pasteurella* species *(canis* in dogs and *multocida* in cats) are usually present in bite site cultures, a complex mix of various other pathogens, such as streptococci, staphylococci, *Moraxella*, *Neisseria*, *Fusobacterium*, *Bacteroides,* and those individually discussed below, make the combination amoxicillin-clavulanate the best choice of initial therapy. Gatifloxacin and linezolid are other effective medications.

Capnocytophaga canimorsus, formerly referred to as DF-2, is a Gram-negative rod that is part of the normal oral flora of dogs and cats. It is associated with severe septicemia after dog bites. Patients who have undergone splenectomy are at particular risk. Alcoholism, chronic respiratory disease, and other medical conditions also predispose to infection; only one-quarter of patients were healthy before infection with *C. canimorsus.* A characteristic finding is a necrotizing eschar at the site of the bite. Fever, nausea, and vomiting occur abruptly within 1-3 days, and the eschar develops soon thereafter. Disseminated intravascular coagulation and extensive dry gangrene may complicate the course. Sepsis after a dog bite is another hazard faced by splenectomized patients in addition to their particular problems with pneumococcus, *H. influenzae* group B, babesiosis, *N. meningitidis,* and group A streptococcus. *C. canimorsus* is difficult to identify by conventional cultures. Laboratory personnel need to be aware of the clinical suspicion of infection with this organism. A false- positive latex agglutination test for cryptococcal antigen in the

spinal fluid may occur. Treatment is with intensive intravenous antibiotics. In less severely affected patients amoxicillin-clavulanate may be effective.

Eugonic fermenting bacteria (EF-4) and *Bergeyella zoohelcum* are other oral and nasal commensals in dogs; thus, most reports of human disease follow animal bites. *Eikenella corro- dens,* a facultative Gram-negative bacillus, is a normal inhabitant of the human mouth. Most infections are caused by human bites or fist fights. Amoxicillin-clavulanate or penicillin G is effective.

Glanders

Once known as equinia, farcy, and malleus, glanders is a rare, usually fatal, infectious disease that occurs in humans by inoculation with *Burkholderia mallei.* It is encountered in those who handle horses, mules, or donkeys.

The distinctive skin lesion is an inflammatory papule or vesicle that arises at the site of inoculation, rapidly becomes nodular, pustular, and ulcerative, and forms an irregular excavation with undermined edges and a base covered with a purulent and sanguineous exudate. In a few days or weeks other nodules (called "farcy buds") develop along the lymphatics in the adjacent skin or subcutaneous tissues; subsequently, these break down. In the acute form, the skin involvement may be severe and accompanied by grave diarrhea. In the chronic form, there are few skin lesions and milder constitutional symptoms, but repeated cycles of healing and breakdown of nodules may occur for weeks.

The respiratory mucous membranes are especially susceptible to the disease. After accidental inhalation, first catarrhal symptoms are present and there may be epistaxis or a mucoid nasal discharge. The nasal discharge is a characteristic feature of the disease.

The diagnosis is established by finding the Gram-negative organism in this discharge or in the skin ulcers, and should be confirmed by serum agglutination. This organism has been fatal to many laboratory workers, and exposure in this setting is increasing, with *B. mallei* considered a bioterrorism threat.

Treatment is chiefly by immediate surgical excision of the inoculated lesions and antibiotics. Augmentin, doxycycline, or trimethoprim-sulfamethoxazole for up to

5 months' duration may be effective in disease limited to the skin, while parenteral ceftazidime can be used for severe or septic infection. Imipenem and doxycycline combination cured an infected laboratory worker.

Bovine farcy also occurs and is caused by *Nocardia farcinica*. Schiff et al reported a nonimmunocompromised patient with an infected facial laceration. Osteomyelitis complicated the course. Amikacin treatment after surgical debridement resulted in complete cure.

Melioidosis

Melioidosis (Whitmore's disease) is a specific infection caused by a glanders-like bacillus, *Burkholderia pseudomallei*. The disease has an acute pulmonary and septicemic form in which multiple miliary abscesses in the viscera occur, resulting in rapid death. Less often, it runs a chronic course, with subcutaneous abscesses and multiple sinuses of the soft tissues. Its clinical characteristics are similar to glanders, disseminated fungal infections, and tuberculosis. Severe urticaria and necro- tizing fasciitis are uncommon complications.

Melioidosis is endemic in Southeast Asia and should be suspected in military personnel and travelers who have characteristic symptoms of a febrile illness and have been in that region. Recrudescence of disease after a long latency period may occur. Diagnosis is made from the recovery of the bacillus from the skin lesions or sputum, and by serologic tests.

Effective therapy is guided by the antibiotic sensitivity of the specific strain. For the acute septicemic phase, ceftazidime or imipenem is indicated. The majority of chronic cutaneous infections respond well to trimethoprim-sulfamethoxazole and doxycycline. Maintenance with this combination should continue for 20 weeks.

Infections caused by Bartonella

Bartonella are aerobic, fastidious, Gram-negative bacilli. Several species cause human diseases, including *Bartonella henselae* (cat-scratch disease and bacillary angiomatosis), *Bartonella quintana* (trench fever and bacillary angiomatosis), *Bartonella bacilliformis* (verruga peruana and Oroya fever), and *Bartonella*

clarridgeiae (a possible cause of cat-scratch disease). These agents are transmitted by arthropod vectors in some cases. Unique to this genus is the ability to cause vascular proliferation, as is seen in bacillary angiomatosis and verruga peruana. The bartonellae in affected tissue stain poorly with tissue Gram stain, and are usually identified in tissue using modified silver stains such as Warthin-Starry. They are difficult to culture, making tissue identification of characteristic bacilli an important diagnostic test. Electron microscopy and PCR can be used if routine staining is negative.

Cat-scratch disease

Cat-scratch disease is relatively common. About 22 000 cases are reported annually in the US, with between 60% and 90% of cases occurring in children and young adults. Cat-scratch disease is the most frequent cause of chronic lymphadenopa- thy in children and young adults.

B. henselae causes the vast majority of cases of cat-scratch disease. The infectious agent is transmitted from cat to cat by fleas, and from cats to humans by cat scratches or bites. Rarely, dog bites may transmit this infection. The organism can be found in the primary skin and conjunctival lesions, lymph nodes, and other affected tissues. In geographic areas where cat fleas are present, about 40% of cats are asymptomatically bacteremic with this organism.

The primary skin lesion appears within 3-5 days after the cat scratch, and may last for several weeks (Fig. 42). It is present in 50-90% of patients. The primary lesion is not crusted and lymphangitis does not extend from it. The primary lesion may resemble an insect bite but is not pruritic. It heals within a few weeks, usually with no scarring.

Lymphadenopathy, the hallmark of the disease, appears within a week or two after the primary lesions or between 10 and 50 days (average 17 days) after inoculation. Usually, the lymphadenopathy is regional and unilateral. Because most inoculations occur on the upper extremities, epitrochlear and axillary lymphadenopathy is most common (50%), followed by cervical (25%) or inguinal

(18%). Generalized lymphaden- opathy does not occur, but systemic symptoms such as fever, malaise, and anorexia may be present. Without treatment the adenopathy resolves over a few weeks to months, with spontaneous suppuration occurring in between 10% and 50% of cases. If the primary inoculation is in the conjunctiva, there is chronic granulomatous conjunctivitis and preauricular adenopathy-the so-called oculoglandular syndrome of Parinaud. Uncommonly, acute encephalopathy, osteolytic lesions, hepatic and splenic abscesses, hypercalcemia, and pulmonary manifestations have been reported. In addition, erythema nodosum and a diffuse exanthem may accompany cat-scratch disease.

Diagnosis is made largely on clinical features. The primary skin lesion or lymph node may be biopsied and the infectious agent identified. Involved lymph nodes and skin lesions demonstrate granulomatous inflammation with central "stellate" necrosis. A serologic test is available but is not reproducibly positive early in the disease, limiting its usefulness. Cat-scratch skin testing (Hanger and Rose test) can be used but is rarely required if the history and clinical features are characteristic. Other infectious and neoplastic causes of localized lymph- adenopathy, such as tularemia, sporotrichosis, atypical myco- bacterial infection, and Hodgkin disease, may need to be excluded.

The vast majority of cases of cat-scratch disease resolve spontaneously without antibiotic therapy. Such therapy has not been demonstrated to shorten the duration of the disease in most typical cases. Fluctuant lymph nodes should be aspirated, not incised and drained. In patients with severe visceral disease, azithromycin, erythromycin, tetracycline or doxy- cycline is effective.

Trench fever

Trench fever is caused by *Bartonella quintana*, which is spread from person to person by the body louse. Urban cases of trench fever caused by this agent are now most commonly seen in homeless louse-infested persons.

Fig. 42 Primary cat-scratch lesion with lymphadenopathy.

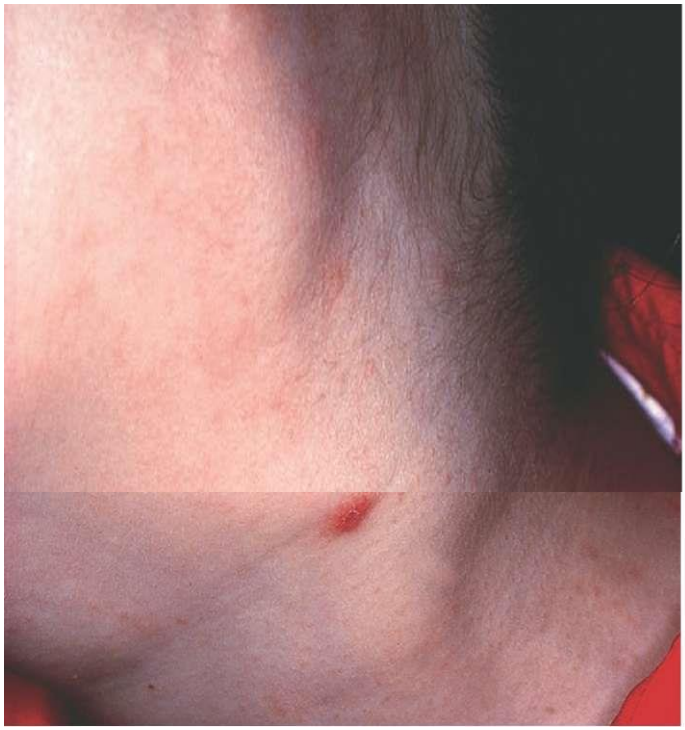
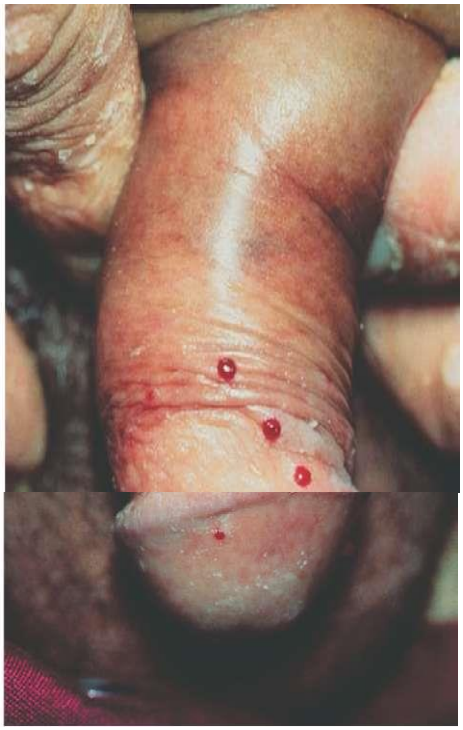


Fig. 43 Bacillary angiomat



Patients present with fever that initially lasts about a week, then recurs about every 5 days. Other symptoms are headache, neck, shin, and back pain. Endocarditis may occur. There are no skin lesions.

Treatment has not been studied systematically. Ceftriaxone for 7 days, followed by erythromycin or another macrolide for 2-4 months, is one effective regimen.

Bacillary angiomatosis

Bacillary angiomatosis describes a clinical condition characterized by vascular skin lesions resembling pyogenic granulomas (Fig. 43). Only two organisms have been proven to cause bacillary angiomatosis: *B. henselae* (the cause of cat-scratch disease) and *B. quintana* (the cause of trench fever). The skin lesions caused by these two agents are identical. If the bacillary angiomatosis is caused by *B. henselae*, there is usually a history of cat exposure, and the same *Bartonella* can also be isolated from the blood of the source cat. Bacillary angiomatosis caused by *B. quintana* is associated with homelessness and louse infestation. The incubation period is unknown but may be years.

Bacillary angiomatosis occurs primarily in the setting of immunosuppression, especially AIDS. The helper T-cell count is usually less than 50/mL. Other immunosuppressed patients, such as those with leukemia or transplants, may acquire the condition. Rarely, bacillary angiomatosis can occur in HIV- negative persons with no apparent immune impairment. In immunoincompetent hosts, the bacteria proliferate locally and are frequently blood-borne. The local proliferation of bacteria produces the angiogenic vascular endothelial growth factor (VEGF), leading to endothelial cell proliferation and the characteristic skin lesions. Immunocompetent hosts resist this bacterial proliferation, resulting in granulomatous and necrotic, rather than angiomatous, lesions.

Several different forms of cutaneous lesions occur. The most common form resembles pyogenic granuloma, which may exhibit a surrounding collarete of scale. Less commonly, subcutaneous masses, plaques, and ulcerations may occur. A single patient may exhibit several of these morphologies. Lesions are tender and bleed easily. Subcutaneous nodules are also tender and may be poorly marginated. Lesions may number from one to thousands, usually with the number gradually increasing over time if the patient is untreated.

In the setting of bacillary angiomatosis, the infection must be considered disseminated. Bacteremia is detected in about 50% of affected AIDS patients leading to involvement of many visceral sites, most frequently the lymph node, liver and spleen, and bone. Less commonly, pulmonary, gastrointestinal, muscle, oral, and brain lesions can occur. *B. henselae* is usually associated with lymph node and liver and spleen involvement, whereas *B. quintana* more often causes bone disease and subcutaneous masses. Visceral disease can be confirmed by appropriate radiologic or imaging studies. Bone lesions are typically lytic, resembling osteomyelitis. In the liver and spleen "peliosis" occurs. Liver function tests characteristically demonstrate a very elevated lactic dehydrogenase level, an elevated alkaline phosphatase level, slight elevation of the levels of hepatocellular enzymes, and a normal bilirubin level. Lesions on other epithelial surfaces, in muscle, and in lymph nodes are usually angiomatous.

Biopsies of bacillary angiomatosis skin lesions have the same low-power appearance as a pyogenic granuloma, with the proliferation of endothelial cells, forming normal small blood vessels. Bacillary angiomatosis is distinguished from pyogenic granuloma by the presence of neutrophils throughout the lesion, not just on the surface, as is seen in a pyogenic granuloma. The neutrophils are sometimes aggregated around granular material that stains slightly purple. This purple material represents clusters of organisms, which can at times be confirmed by modified silver stain such as the Steiner stain. Tissue Gram stain does not routinely stain the bacteria in bacillary angiomatosis lesions. Electron microscopy may identify bacteria in cases in which special stains are negative. Bacillary angiomatosis is easily distinguished histologically from Kaposi sarcoma. In patch or plaque lesions of Kaposi sarcoma the new blood vessels are abnormal in appearance, being angulated. Endothelial proliferation in Kaposi sarcoma is seen in the dermis around the eccrine units, follicular structures, and existing normal vessels. Nodular Kaposi sarcoma is a spindle cell tumor with slits rather than well-formed blood vessels. Neutrophils and purple granular material are not found in Kaposi sarcoma, but intracellular hyaline globules are present.

The natural history of bacillary angiomatosis is extremely variable. In most patients, however, either lesions remain stable or the size or number of lesions gradually increases over time. The initial lesions are usually the largest, and multiple satellite or disseminated smaller lesions occur, representing miliary spread. Untreated bacillary angiomatosis can be fatal, with patients dying of visceral disease or respiratory compromise from obstructing lesions.

The diagnosis of bacillary angiomatosis is virtually always made by identifying the infectious agent in affected tissue. The organisms can also be cultured from the lesions and the patient's blood. However, these organisms grow very slowly, so cultures may not be positive for more than 1 month. Thus, tissue and blood cultures are usually confirmatory in nature. Antibodies to *Bartonella* can be detected in most patients by an indirect fluorescence assay. Because of its limited availability

and background positivity in the general population of cat owners, this test is not generally useful in establishing the diagnosis of bacillary angiomatosis.

Treatment

Bacillary angiomatosis is dramatically responsive to erythro- mycin, 500 mg four times a day, or doxycycline, 100 mg twice a day. Minocycline, tetracycline, clarithromycin, azithromycin, roxithromycin, and chloramphenicol may also be effective. Trimethoprim-sulfamethoxazole, ciprofloxacin, penicillins, and cephalosporins are not effective. Prophylactic regimens containing a macrolide antibiotic or rifampin prevent the development of bacillary angiomatosis. Treatment duration depends on the extent of visceral involvement. In cases with skin lesions or bacteremia only, at least 8 weeks of treatment are required. For liver and spleen involvement 3-6 months of treatment are recommended, and for bone disease, at least 6 months of treatment should be considered. Once treatment is begun, symptoms begin to resolve within hours to days. A Jarisch-Herxheimer reaction may occur with the first dose of antibiotic. If patients relapse after an apparently adequate course of treatment, chronic suppressive antibiotic therapy should be considered.

Oroya fever and verruga peruana

Oroya fever and verruga peruana represent two stages of the same infection. Oroya fever (Carrion's disease) is the acute febrile stage, and verruga peruana the chronic delayed stage. These conditions are limited to and endemic in Peru and a few neighboring countries in the Andes, and restricted to valleys between 500 and 3200 m above sea level. Both of these conditions are caused by *B. bacilliformis*, which is transmitted by a sandfly, usually *Lutzomyia verrucarum.* Humans represent the only known reservoir. Men represent about three-quarters of cases and all ages may be affected.

After an incubation period averaging 3 weeks, the acute infection, Oroya fever, develops. Symptomatology is highly variable. Some patients have very mild symptoms. Others may have high fevers, headache, and arthralgias. Severe hemolytic anemia can develop, sometimes with leukopenia, and thrombo- cytopenia. Untreated,

the fatality rate is 40-88%, and with antibiotic treatment is still 8%. After the acute infection resolves, a latency period follows, lasting from weeks to months. The eruptive verruga peruana then occur. They are angiomatous, pyogenic granuloma-like lesions, virtually identical clinically and histologically to the lesions of bacillary angiomatosis (Fig. 44). They may be large and few in number (mular form), small and disseminated (miliary form), or nodular and deep.

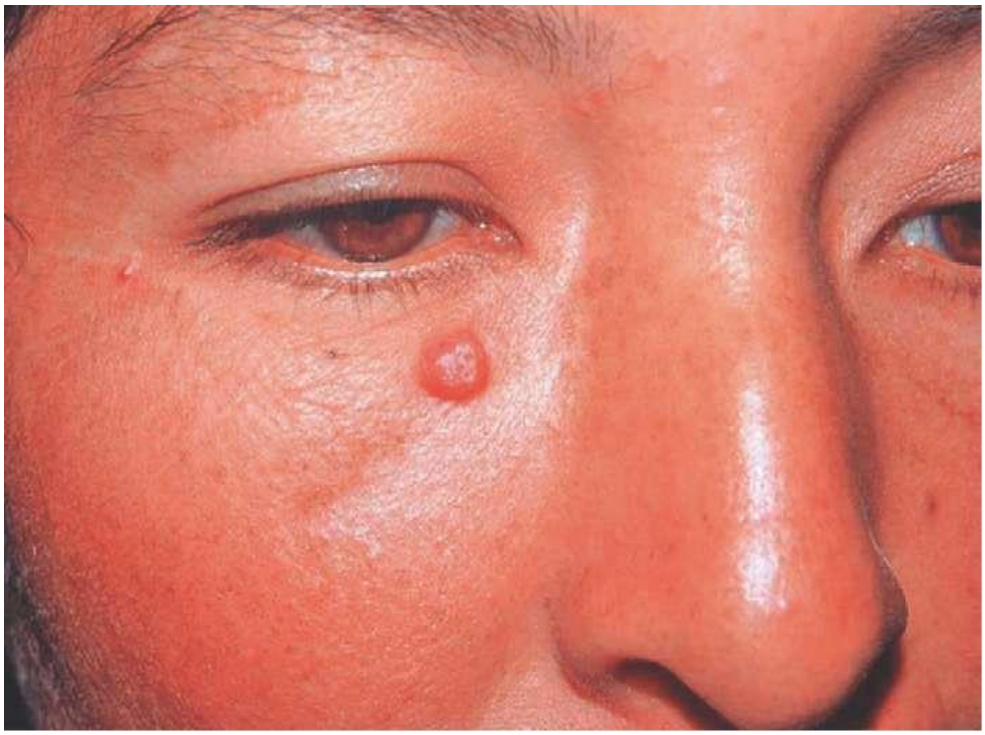


Fig. 44 Verruga peruana. (Courtesy of Francisco Bravo, MD).

Visceral disease has not been found in verruga peruana, which is rarely fatal. Lesions usually heal spontaneously over several weeks to months without scarring. A lasting immunity results from infection.

The diagnosis of Oroya fever is made by identifying the bacteria within or attached to circulating erythrocytes using a Giemsa stain. Verruga peruana can be diagnosed by skin biopsy, showing the same features as bacillary angiomatosis, but with the organisms staining with Giemsa stain.

The antibiotic treatment of choice for Oroya fever is chlor- amphenicol, 2 g/day, since *Salmonella* coinfection is the most scratches, or contact with other infectious material while handling infected cats are an increasing risk factor as

residential development continues in areas of plague foci in the western US. In the US, 89% of cases since 1945 have occurred in the Rocky Mountain states.

Blood, bubo or parabubo aspirates, exudates, and sputum should be examined by smears stained with Gram stain or specific fluorescent antibody techniques, culture, and animal inoculation. A retrospective diagnosis can be made by sero- logic analysis.

The most effective drugs against *Y. pestis* are gentamicin and streptomycin; they should be given intravenously. Other effective drugs include chloramphenicol, the tetracyclines, and cip- rofloxacin. Nearly all cases are fatal if not treated promptly.

Plague

Plague normally involves an interaction among *Yersinia pestis,* wild rodents, and fleas parasitic on the rodents. Infection in humans with *Y. pestis* is accidental and usually presents as bubonic plague. Other clinical forms include pneumonic and septicemic plague.

In the milder form, the initial manifestations are general malaise, fever, and pain or tenderness in areas of regional lymph nodes, most often in the inguinal or axillary regions. In more severe infections, findings of toxicity, prostration, shock, and, occasionally, hemorrhagic phenomena prevail. Less common symptoms include abdominal pain, nausea, vomiting, constipation followed by diarrhea, generalized macular erythema, and petechiae. Rarely, vesicular and pustular skin lesions occur.

Plague is caused by *Y. pestis,* a pleomorphic, Gram-negative bacillus. The principal animal hosts involved have been rock squirrels, prairie dogs, chipmunks, marmots, skunks, deer mice, wood rats, rabbits, and hares. Transmission occurs through contact with infected rodent fleas or rodents, pneumonic spread, or infected exudates. *Xenopsylla cheopis* (Oriental rat flea) has traditionally been considered the vector in human outbreaks, but *Diamanus montanus, Thrassis bacchi,* and *Opisocrostis hirsutus* are species of fleas on wild animals responsible for spreading sylvatic plague in the US. Rodents carried home by dogs or cats are a potential source-and an important one in veterinarians-of infection. The bites, Rat-bite fever.

This febrile, systemic illness is usually acquired by direct contact with rats or other small rodents, which carry the Gram- negative organisms *Spirillum minor* and *Streptobacillus moniliformis* among their oropharyngeal flora. *S. moniliformis* is the principal cause in the US. Crowded living conditions, home- lessness, working with rats in medical research or in pet shops, or having one as a pet are predisposing factors in some infected patients. Although it usually follows a rat bite, infection may follow the bites of squirrels, cats, weasels, pigs, and a variety of other carnivores that feed on rats.

There are at least two distinct forms of rat-bite fever: "sodoku," caused by *S. minor;* and septicemia, caused by *S. moniliformis,* otherwise known as epidemic arthritic erythema or Haverhill fever. The latter usually follows the bite of a rat, but some cases have been caused by contaminated milk. The clinical manifestations of these two infections are similar in that both produce a systemic illness characterized by fever, rash, and constitutional symptoms. However, clinical differentiation is possible.

In the streptobacillary form, incubation is brief, usually lasting 10 days after the bite, when chills and fever occur. Within 2-4 more days the generalized morbilliform eruption appears and spreads to include the palms and soles. It may become petechial. Arthralgia is prominent, and pleural effusion may occur. Endocarditis, pneumonia, and septic infarcts often follow, and 10% of untreated cases may die from these causes.

Although infection with *S. minor* also begins abruptly with chills and fever, the incubation period is longer, ranging from 1 to 4 weeks. The bite site is often inflamed and may become ulcerated. Lymphangitis may be present. The eruption begins with erythematous macules on the abdomen, resembling rose spots, which enlarge, become purplish-red, and form extensive indurated plaques. Arthritis may rarely occur. Endocarditis, nephritis, meningitis, and hepatitis are potential complications. Around 6% of untreated patients die.

In both types of disease a leukocytosis of 15 000-30 000/mm^3 is present, sometimes with eosinophilia. A biologic false- positive venereal disease research

laboratory (VDRL) test is found in 25-50% of cases. The course without treatment is generally from 1 to 2 weeks, though relapses may occur for months.

The diagnosis is confirmed by culturing the causative organism from the blood or joint aspirate, or demonstration of an antibody response in the streptobacillary form. *S. minor* is demonstrable by animal inoculation with the patient's blood, usually in the guinea pig or mouse. Their blood will show large numbers of organisms in Wright-stained smears. Demonstration of *S. minor* in a darkfield preparation of exudate from an infected site establishes the diagnosis.

Rat-bite fever must be differentiated from erysipelas, pyo- genic cellulitis, viral exanthems, gonococcemia, meningococ- cemia, and Rocky Mountain spotted fever.

Prompt cauterization of bites by nitric acid may prevent the disease. Cleansing of the wound, tetanus prophylaxis, and 3 days of penicillin (2 g/day) are recommended for patients seen shortly after a bite. Both types respond readily to penicillin, tetracycline, or streptomycin therapy.

Tularemia

Tularemia, also known as Ohara's disease or deer fly fever, is a febrile disease caused by *Francisella tularensis,* a short, nonmotile, non-spore-forming, Gram-negative coccobacillus. Tularemia is characterized by sudden onset, with chills, headache, and leukocytosis, after an incubation period of 2-7 days. Its clinical course is divided into several general types. The causative organism poses a bioterrorism threat.

The vast majority are the ulceroglandular type, which begins with a primary papule or nodule that rapidly ulcerates at the site of infection. This usually occurs through contact with tissues or body fluid of infected mammals, via an abrasion or scratch (Fig. 45), usually on the fingers, neck, or conjunctiva. The bites of a tick, *Dermacentor andersoni* or *Amblyomma americanum,* and of a deer fly, *Chrysops discalis,* also transmit this disease, and in such cases primary lesions are usually found on the legs or the perineum. The primary ulcer is tender, firm, indolent, and punched out, with a necrotic base that heals with scar formation in about 6 weeks. A lymphangitis spreads from the primary lesion; the regional lymph glands become

swollen, painful, and inflamed, and tend to break down, forming subcutaneous suppurative nodules resembling those of sporotrichosis. The ulcers extend in a chain from the ulcer to the enlarged lymphatic glands.

The course of the ulceroglandular type is marked in the early stages by headache, anorexia, and vomiting, and by articular and muscular pains. The fever is at first continuous, varying between 102 and 104°F, and later shows morning remissions, then falls by lysis to normal. Other skin lesions are encountered in the A

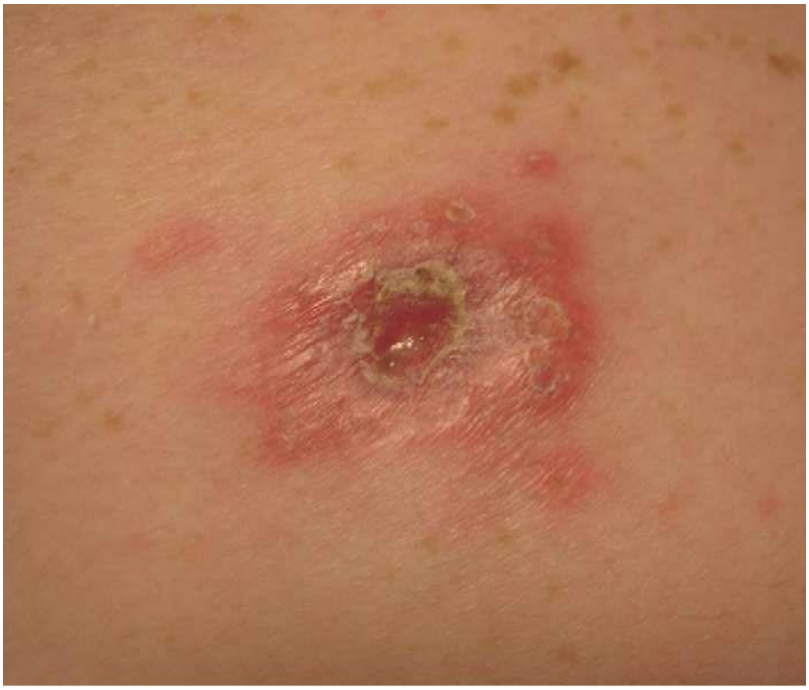


Fig. 14-45 Tularemia.

macular, papular, vesicular, or petechial exanthem may occur. Erythema multiforme and erythema nodosum often occur. The clinical similarity of the primary ulcer of tularemia to a chancre of sporotrichosis is important in the differential diagnosis. In the typhoidal type the site of inoculation is not known and there is no local sore or adenopathy. This form of the disease is characterized by persistent fever, malaise, gastrointestinal symptoms, and the presence of specific agglutinins in the blood serum after the first week. Other uncommon types include an oculoglandular form, in which primary conjunctivitis is accompanied by enlargement of the regional lymph nodes; the pneumonic type, which occurs rarely in laboratory workers and is most severe; the oropharyngeal form, which may occur after ingestion of infected and inadequately cooked meat; and the glandular type, in which there is no primary

lesion at the site of infection, but there is enlargement of regional lymph glands followed by generalized involvement. Several cases, mostly in children, have been acquired from cat bites, the cats having previously bitten infected rabbits. The most frequent sources of human infection are the handling of wild rabbits and the bite of deer flies or ticks. Outbreaks of the disease occur chiefly at those times of the year when contact with these sources of infection is likely. No instance of the spread of the infection from person to person by contact has been reported. The disease occurs most often in the western and southern US, although cases have been reported in almost all parts of the US and in Japan. In Russia and other countries in the northern hemisphere it may be contracted from polluted water contaminated by infected rodent carcasses. A definite diagnosis is made by staining smears obtained from the exudate with specific fluorescent antibody. *F. tularen- sis* can be cultured only on special media containing cystine glucose blood agar or other selective media. Routine culture media do not support growth. The bacilli can be identified by inoculating guinea pigs intraperitoneally with sputum or with bronchial or gastric washings, exudate from draining lymph nodes, or blood. The agglutination titer becomes positive in the majority of patients after 2 weeks of illness. A four-fold rise in titer is diagnostic; a single convalescent titer of 1 : 160 or greater is diagnostic of past or current infection. PCR is also successful in identifying the infectious agent.

The main histologic feature of tularemia is that of a granuloma; the tissue reaction consists primarily of a massing of endothelial cells and the formation of giant cells. Central necrosis and liquefaction occur, accompanied by polymorpho- nuclear leukocytic infiltration. Surrounding this is a tubercu- loid granulomatous zone, and peripherally lymphocytes form a third zone. Small secondary lesions may develop. These pass through the same stages and tend to fuse with the primary one.

All butchers, hunters, cooks, and others who dress rabbits should wear protective gloves when doing so. Thorough cooking destroys the infection in a rabbit, thus rendering an infected animal harmless as food. Ticks should be removed

promptly, and tick repellents may be of value for people with occupations that require frequent exposure to them.

Streptomycin, 1 g intramuscularly every 12 h for 10 days, is the treatment of choice. Obvious clinical improvement occurs after 48 h, although the fever may persist for as long as a week after treatment is begun. Gentamicin is also effective, but the tetracyclines are useful only if given in high doses for 15 days. In vitro testing and numerous case reports and small case series are documenting the excellent effects of the quinolones, especially ciprofloxacin, 500-750 mg twice a day for 10 days, or levofloxacin, 500 mg/day for 2 weeks.

Brucellosis

Brucellosis is also known as undulant fever. Brucellae are Gram-negative rods that produce an acute febrile illness with headache, or at times an indolent chronic disease characterized by weakness, malaise, and low-grade fever. Brucellosis is acquired primarily by contact with infected animals or animal products. Primarily, workers in the meat-packing industry are at risk; however, veterinarians, pet owners, and travelers who consume unpasteurized milk or cheese may also acquire the disease.

Approximately 5-10% of patients develop skin lesions. The variety of cutaneous manifestations reported is large. Erythematous papules, diffuse erythema, abscesses, erysipelaslike lesions, leukocytoclastic vasculitis, thrombocytopenic purpura, Stevens-Johnson syndrome, and erythema nodosum- like lesions are some possible findings. Biopsy may reveal noncaseating granulomas.

Diagnosis is by culture of blood, bone marrow, or granulo- mas, and may be confirmed by a rising serum enzyme-linked immunosorbent assay (ELISA) or agglutination titer. PCR is available as well. Treatment is with doxycycline and streptomycin in combination for 6 weeks.

RICKETTSIAL DISEASES

Rickettsiae are obligate, intracellular, Gram-negative bacteria. The natural reservoirs of these organisms are the bloodsucking arthropods; when transmitted to humans through insect inoculation, the rickettsiae may produce disease. Most of the human diseases incurred are characterized by skin eruptions, fever, headache, malaise, and prostration. Diagnosis is usually made by indirect fluorescence antibody testing, which may be confirmed by Western blot or PCR; therapy is with doxycycline, 100 mg twice a day for 7 days. In addition to those diseases discussed in the following sections, Q fever, caused by *Coxiella burnetii,* is an acute, febrile illness from this general class that uncommonly has skin manifestations, but these are nonspecific and nondiagnostic in nature.

Typhus group

Louse-borne epidemic typhus, caused by *Rickettsia prowazekii*, mouse, cat, or rat flea-borne endemic typhus, caused by *Rickettsia typhi,* and scrub typhus, a mite-borne infection caused by *Rickettsia tsutsugamushi,* constitute this group.

Epidemic typhus

Humans contract epidemic typhus from an infestation by body lice *(Pediculus humanus* var. *corporis),* which harbor the rickettsiae. *R. prowazekii* is not transmitted transovarially, since it kills the louse 1-3 weeks after infection. For many years humans were the only known vector, but several cases of sporadic disease have been reported in which there was direct or indirect contact with the flying squirrel, and a reservoir apparently exists in this animal. While the louse feeds on the person's skin, it defecates. The organisms in the feces are scratched into the skin. Some 2 weeks after infection the prodromal symptoms of chills, fever, aches, and pains appear. After 5 days a pink macular eruption appears on the trunk and axillary folds and rapidly spreads to the rest of the body, but usually spares the face, palms, and soles. These macules may later become hemorrhagic, and gangrene of the fingers, toes,

nose, and earlobes may occur. Mortality is 6-30% in epidemics, with the highest death and complication rates occurring in patients over the age of 60.

Serologic testing using immunofluorescent antibody (IFA) and Western blot for specificity becomes positive after the 8th-12th day of illness.

Doxycycline, 100 mg twice a day for 7 days, is curative. Prophylaxis is by vaccination and delousing; people who succumb are usually living under miserable sanitary conditions such as occur during war and following natural disasters. Vaccination is suggested only for special high-risk groups.

Brill-Zinsser disease may occur as a recrudescence of previous infection, with a similar but milder course of illness, which more closely resembles endemic typhus.

Endemic typhus

Endemic (murine) typhus is a natural infection of rats and mice by *R. typhi*, sporadically transmitted to humans by the rat flea, *Xenopsylla cheopis.* In south Texas, the disease is transmitted by the cat flea *Ctenocephalides felis*, with opposums as the natural reservoir of disease. It has the same skin manifestations as epidemic typhus (Fig. 46), but they are less severe, and gangrene does not supervene. Approximately 50% of patients with murine typhus had a skin eruption. Serologic testing using IFA and Western blot for specificity becomes positive in 50% of patients at 1 week and nearly all by 2 weeks. Fever and severe headache are suggestive early symptoms.

This disease occurs worldwide. In the US, the southeastern states and those bordering the Gulf of Mexico have been the most common sites of incidence. It most often occurs in urban settings, with peak incidence in the summer and fall.

Treatment is the same as that for louse-borne (epidemic) typhus.

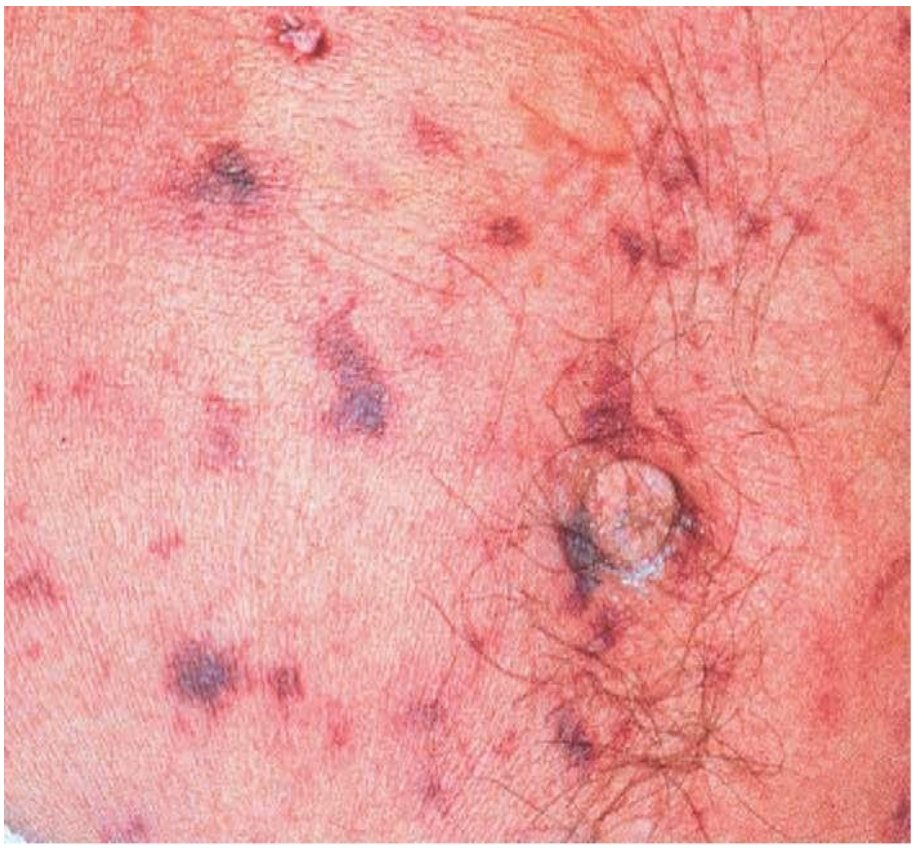


Fig. 46 Endemic typhus. (Courtesy of Richard DeVillez, MD)

Scrub typhus

Also known as tsutsugamushi fever, scrub typhus is characterized by fever, chills, intense headache, skin lesions, and pneu- monitis. The primary lesion is an erythematous papule at the site of a mite bite, most commonly on the scrotum, groin, or ankle. It becomes indurated, and a multilocular vesicle rests on top of the papule. Eventually, a necrotic ulcer with eschar and surrounding indurated erythema develops and there is regional lymphadenopathy. Some 10 days after a mite bite, fever, chills, and prostration develop, and within 5 days thereafter pneumonitis and the skin eruption evolve. The erythema- tous macular eruption begins on the trunk, extends peripherally, and fades in a few days. Deafness and tinnitus occur in about one-fifth of untreated cases.

Scrub typhus is caused by *R. tsutsugamushi.* The vector is the trombiculid red mite (chigger), which infests wild rodents in scrub or secondary vegetation in transitional terrain between forests and clearings in Far Eastern countries such as Japan, Korea, Southeast Asia, and Australia.

Serologic diagnosis and treatment are as for other forms of rickettsias; however, in areas of the world where there is reduced susceptibility to tetracyclines, such as Thailand, rifampin is more reliable.

Spotted fever group

This group includes Rocky Mountain spotted fever, caused by *R. rickettsii;* Mediterranean (boutonneuse) fever, which when seen in Africa has been called Kenyan or South African tick- bite fever, caused by *Rickettsia conorii;* North Asian tick-borne rickettsiosis, caused by *Rickettsia sibirica;* Queensland tick typhus, caused by *Rickettsia australis;* African tick-bite fever, caused by *Rickettsia africae;* Flinders Island spotted fever, caused by *Rickettsia honei;* Yucatan spotted fever, caused by *Rickettsia felis* carried by the cat flea vector *Ctenocephalides felis;* Japanese spotted fever, caused by *Rickettsia japonica;* a spotted fever in the US caused by *Rickettsia parkeri;* and Russian vesicular rickettsiosis, caused by *Rickettsia akari.* Additionally, tick- borne lymphadenopathy (TIBOLA) and *Dermacentor*-borne necrosis-eschar-lymphadenopathy (DEBONEL) are linked to a disease transmitted by the *Dermacentor* tick; they have distinctive features. The tick usually attaches to the scalp, and will cause an eschar and sometimes alopecia. Adenopathy, fever, and a spotted eruption occur.

Only the first two types of spotted fever will be discussed in detail. They all are characterized by headache, fever, and a rash, the latter most frequently being a pink papular eruption, which may have petechiae, and in the case of African tick-bite fever, eschars. All are treated with doxycycline, 100 mg twice a day for 7 days. Most respond well and complications are minimal. Ticks are the vectors of all but the Yucatan spotted fever. Tick prevention strategies are outlined in Chapter 20.

Rocky Mountain spotted fever

One to 2 weeks after the tick bite, chills, fever, and weakness occur. An eruption appears, but unlike typhus it begins on the ankles, wrists, and forehead rather than on the trunk. The initial lesions are small, red macules, which blanch on

pressure and rapidly become papular in untreated patients. Spread to the trunk occurs over 6-18 h, and the lesions become petechial and hemorrhagic over a period of 2-4 days (Fig. 47).

A vasculitis of the skin is the pathologic process, and *R. rickettsii* can be found in these initial macules by applying a fluorescent antibody technique to frozen sections. This is a very specific, but not very sensitive, method.

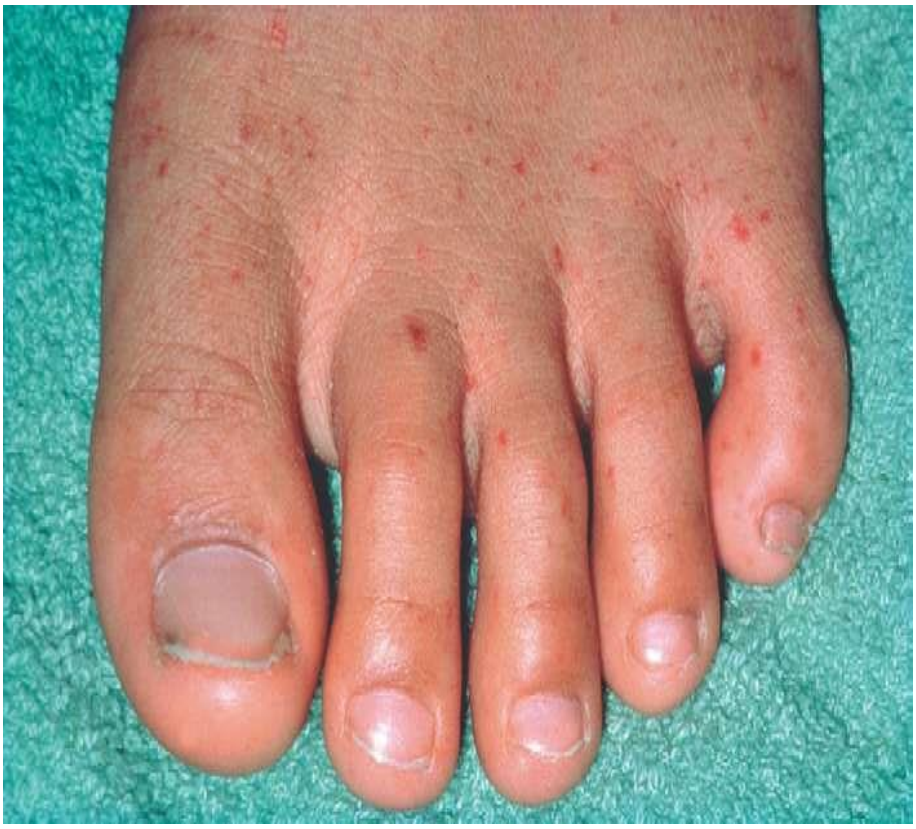


Fig. 47 Rocky Mountain spotted fever.

In the 10-20% of cases without a rash, the risk of a delay in diagnosis and a fatal outcome is greatest, with the case fatality rate rising precipitously if antibiotics are not initiated before the fifth day. An eschar will occasionally be present at the tick bite site and is a subtle clue to the diagnosis. In severe untreated cases a multisystem disorder appears, with renal, pulmonary, and central and peripheral nervous system abnormalities, and hepatomegaly most commonly found. Mortality in older persons approaches 60%; it is far lower in younger patients.

Ticks spread the causative organism, *R. rickettsii*. Principal offenders are the wood tick *(Dermacentor andersoni)*, the dog tick *(D. variabilis* and *R. sanguineus* in Arizona), and the Lone Star tick *(Amblyomma americanum).*

Antibodies become positive in the second or third week of illness, too late to be of help when the decision to institute therapy is necessary. This decision is made by clinical considerations. A clue may be the recent illness of a pet dog, as *R. rickettsii* will cause symptomatic illness in infected dogs.

Treatment is with doxycycline, 100 mg twice a day for 7 days.

Mediterranean spotted fever

Boutonneuse fever, or Mediterranean fever, is an acute febrile disease endemic in southern Europe and northern Africa, and is the prototype of the spotted fever group of diseases. It affects children mostly and is characterized by a sudden onset with chills, high fever, headache, and lassitude. The tick bite produces a small, indurated papule known as tache noire, which becomes a necrotic ulcer (Fig. 48). The erythematous macular and papular eruption develops on the trunk (Fig. 49), palms, and soles.

The causative organism is *R. conorii,* transmitted by the dog tick, *Rhipicephalus sanguineus*.

As with all rickettsial diseases, the diagnosis is confirmed with serology and treatment is with doxycycline. Even without therapy the prognosis is good, and complications are rare.

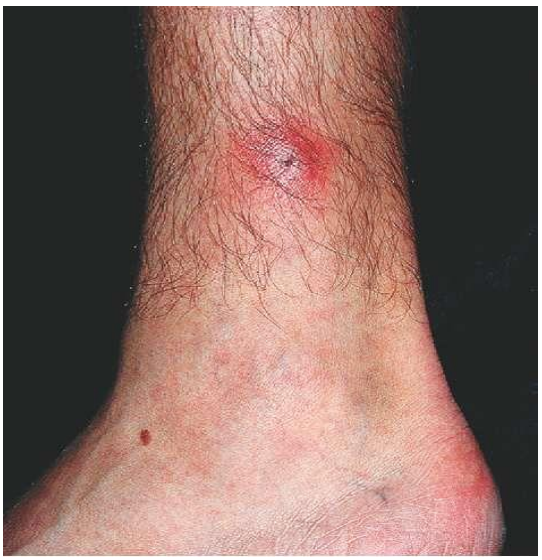
Rickettsialpox

First recognized in New York in 1946, rickettsialpox has been found in other cities of the US and in Russia. It is an acute febrile disease characterized by the appearance of an initial lesion at the site of the mite bite about a week before the onset of the fever. This firm, 5-15 mm round or oval vesicle persists for 3-4 weeks and heals with a small pigmented scar. Regional lymphadenitis is present. The fever is remittent and lasts about 5 days. Chills, sweats, headache, and backache

accompany the fever. A rash resembling varicella develops 3 or 4 days after the onset of fever. This secondary eruption is papulovesicular, numbers approximately 5-50 lesions, and is generalized in distribution. It fades in about 1 week.

The rodent mite, *Allodermanyssus (Liponyssoides) sanguineus,* transmits the causative organism, *Rickettsia akari.* The house mouse *(Mus musculus)* is the reservoir. All cases have occurred in neighborhoods infested by mice, on which the rodent mite has been found.

Diagnosis is confirmed by serologic testing. The disease is self-limited, and complete involution occurs in at most 2 weeks. Doxycycline is the agent of choice for treatment.



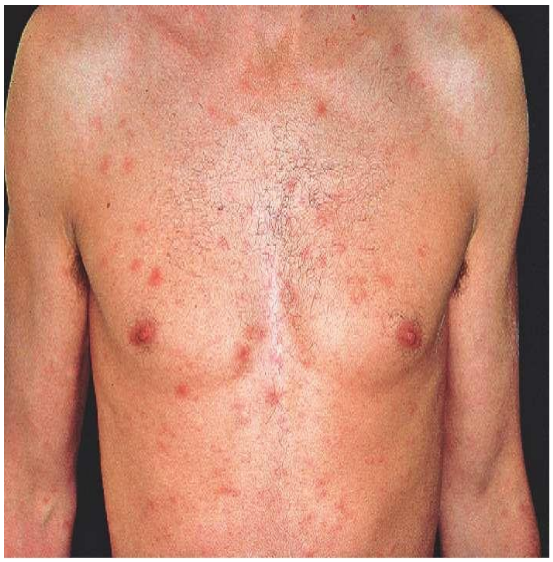


Fig. 48 Tache noire in boutonneuse fever. **Fig. 49** Boutonneuse fever.

Ehrlichiosis

These tick-borne organisms, which affect phagocytic cells, manifest as a febrile illness accompanied by headache and a rash. Human monocytic erhlichiosis (HME) is caused by *Ehrlichia chaffeensis;* human granulocytic anaplasmosis (HGA) by *Anaplasma phagocytophilia* groups; Sennetsu fever, a mononucleosis-type illness, by *Ehrlichia sennetsu;* and *Ehrlichia ewingii* also occasionally produces a similar symptomatic illness.

HME is transmitted by *Amblyomma americanum* or *Dermacentor variabilis.* It is most common in men between the ages of 30 and 60. The predominant regions reporting the disease are the south central, southeastern, and mid-Atlantic states. The same *Ixodes* ticks that transmit Lyme disease and babesiosis transmit HGA, and the infection occurs in the same geographic areas, the northeast and Pacific northwestern US. Coinfection with these agents occurs.

Skin eruptions are present in only about one-third of patients with HME and 10% of those with HGA. The lesions are usually present on the trunk and are nondiagnostic. A mottled or diffuse erythema, a fine petechial eruption, lower extremity vasculitis, and a macular, papular, vesicular, or urticarial morphology have all been seen. Acral edema with desquamation and petechiae of the palate may be present. Involvement of the kidneys, lungs, and CNS occurs in severe cases.

If the diagnosis is suspected, a complete blood count will usually show thrombocytopenia and leukopenia. The leukocytes should be inspected microscopically for intracytoplasmic microcolonies called morulae. They are seen more frequently in HGA than in HME. Indirect immunofluorescent antibodies and the PCR analysis are positive, but asymptomatic infection is frequent and seroprevalence rates are high in endemic areas. Culture of the organism is diagnostic. Doxycycline is the treatment of choice, 100 mg twice a day for 7 days. Severe life- threatening disease is usually seen in the immunosuppressed population.

Leptospirosis

Leptospirosis is also known as Weil's disease, pretibial fever, and Fort Bragg fever. It is a systemic disease caused by many strains of the genus *Leptospira.* After an incubation period of 8-12 days, Weil's disease (icteric leptospirosis) starts with an abrupt onset of chills, followed by high fever, intense jaundice, petechiae, and purpura on both skin and mucous membranes, and renal disease, manifested by proteinuria, hematuria, and azotemia. Death may occur in 5-10% of cases, as a result of renal failure, vascular collapse, or hemorrhage. Leukocytosis of 15 000-30 000/mm^3 and lymphocytosis in the spinal fluid are commonly present.

Pretibial fever ("Fort Bragg fever," anicteric leptospirosis) has an associated acute exanthematous infectious erythema, generally most marked on the shins. High fever, conjunctival suffusion, nausea, vomiting, and headache characterize the septicemic first stage. This lasts 3-7 days, followed by a 1-3- day absence of fever. During the second stage, when IgM antibody develops, headache is intense, fever returns, and ocular manifestations, such as conjunctival hemorrhage and suffusion, ocular pain, and photophobia, are prominent. At this time the eruption occurs. It consists of 1-5 cm erythema- tous patches or plaques that histologically show only edema and nonspecific perivascular infiltrate. The skin lesions resolve spontaneously after 4-7 days. There may be different clinical manifestations from identical strains of *Leptospira.*

Leptospira interrogans, serotype *icterohaemorrhagiae,* has been the most common cause of Weil's disease, whereas pretibial fever is most commonly associated with serotype *autumnalis.* Humans acquire both types accidentally from urine or tissues of infected animals, or indirectly from contaminated soil or from drinking or swimming in contaminated water. Travelers to the tropics who enjoy water sports are at risk. In the continental US, dogs and cats are the most common animal source; worldwide, rats are more often responsible. Leptospira enter the body through abraded or diseased skin, and the gastrointestinal or upper respiratory tract.

Leptospirosis may be diagnosed by finding the causative spirochetes in the blood by darkfield microscopy during the first week of illness, and by blood cultures, guinea pig inoculation, and the demonstration of rising antibodies during the second week of the disease. The microagglutination serologic test is the test of choice, but PCR and ELISA testing are also available.

Treatment with tetracyclines and penicillin shortens the disease duration if given early. Doxycycline, 100 mg/day for a week, is effective in mild disease; however, intravenous penicillin is necessary in severely affected patients. A dose of 200 mg once a week may help prevent infection while visiting a hyperendemic area.

Borreliosis

Spirochetes of the genus *Borrelia* are the cause of Lyme disease. This multisystem infection first presents with skin findings and over the course of time multiple cutaneous signs may occur. These microorganisms are also the cause of relapsing fever, an acute illness characterized by paroxysms of fever. The more common type of relapsing fever is tick-borne, occasionally being reported in the US. A louse-borne type is endemic only in Ethiopia. The nonspecific macular or petechial eruption occurs near the end of the 3-5-day febrile crisis.

Lyme disease

Borrelia burgdorferi sensu lato species complex are responsible for inducing Lyme disease. These spirochetes are transmitted to humans by various members of the family of hard ticks, Ixodidae. Four genomic subspecies are recognized to be geographically prominent and cause varying skin and systemic disease manifestations. *Borrelia burgdorferi sensu stricto* causes Lyme disease in the northeast, midwest, and western US, and *Borrelia lonestari* causes disease in the southern US where the only skin finding is the diagnostic early manifestation, erythema migrans. *Borrelia lonestari* is the cause of STARI (Masters disease), a condition characterized by erythema migrans, headache, stiff neck, myalgia, and arthralgia. *Borrelia garinii* and *Borrelia afzelii* are present in Europe, with the former being the principle agent of Lyme neuroborreliosis and the latter associated with acrodermatitis chronica atrophicans, lymph- ocytoma, and, in some cases, morphea and lichen sclerosis et atrophicus. If it is not treated in the early stage, chronic arthritis and neurologic and cardiac complications frequently develop.

Diagnosing early Lyme disease depends on recognition of the skin eruption. Approximately 50% of patients recall a tick bite, which leaves a small red macule or papule at the site. The areas most often involved are the legs, groins, and axilla, with adults having lower-extremity lesions most often and children being more likely to manifest erythema migrans on the trunk. Between 3 and 32 (median 7) days after the bite, there is gradual expansion of the redness around the papule. The advancing

border is usually slightly raised, warm, red to bluish-red, and free of any scale. Centrally, the site of the bite may clear, leaving only a ring of peripheral erythema, or it may remain red, becoming indurated, vesicular, or necrotic.

In Europe, the large annular variety is most common, while in the US the lesions are usually homogenous or have a central redness. The annular erythema usually grows to a median diameter of 15 cm, but may range from 3 to 68 cm. It is accompanied by a burning sensation in half the patients; rarely is it pruritic or painful. Localized alopecia may result at the site of erythema migrans.

Between 25% and 50% of patients will develop multiple secondary annular lesions, similar in appearance to the primary lesion, but without indurated centers and generally of smaller size (Fig. 50). They spare the palms and soles. Their number ranges from 2 to 100. Without treatment, erythema migrans and the secondary lesions fade in a median of 28 days, although some may be present for months. Of untreated cases, 10% experience recurrences of erythema migrans over the following months. European cases of *Borrelia*- induced lymphocytoma occur early in general, from the time of erythema migrans until 10 months later. These are B-cell proliferations and present as red, indurated papules and plaques, which occur most commonly on the areola or earlobe.

Diffuse urticaria, malar erythema, and conjunctivitis may be present during this early period. Malaise, fever, fatigue, headaches, stiff neck, arthralgia, myalgia, lymphadenopathy, anorexia, and nausea and vomiting may accompany early signs and symptoms of infection.

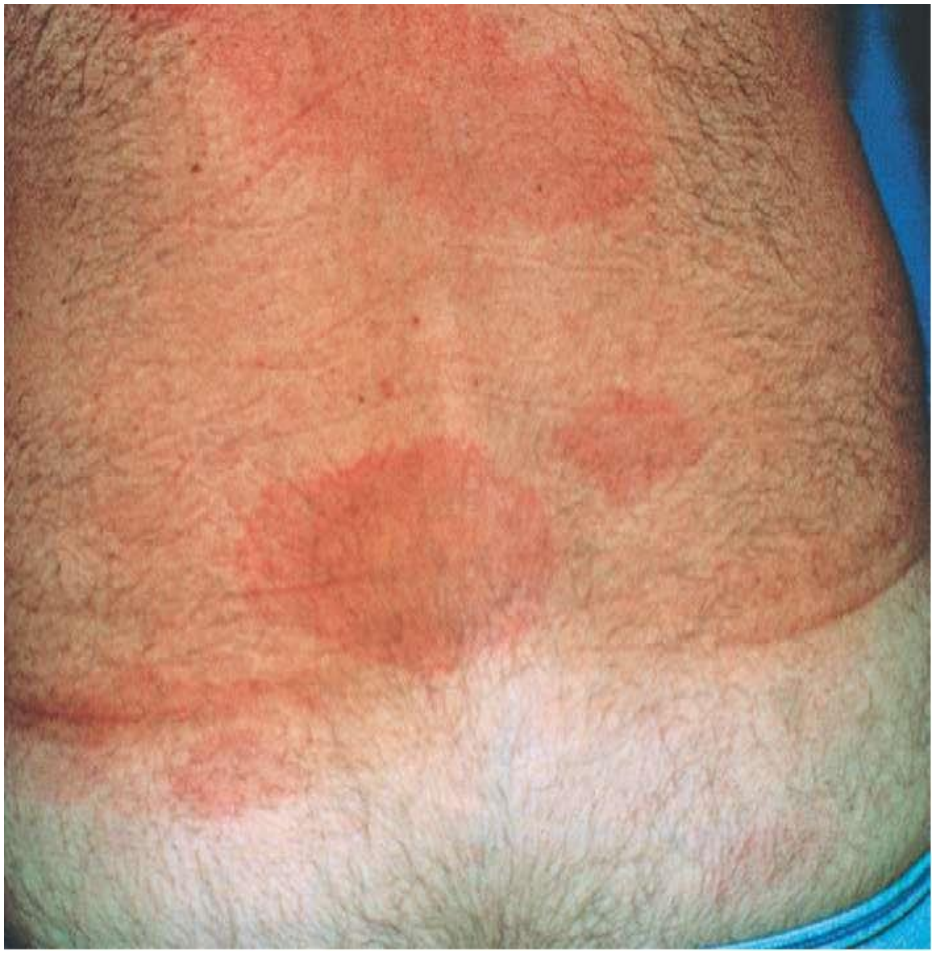


Fig. 50 Secondary lesions of erythema migrans.

Usually the symptoms are of mild severity, mimicking a slight flu-like illness, except in patients coinfected with babesiosis, as is the case in approximately 10% of cases in southern New England. *Ehrlichia* coinfections may also occur, as the latter two diseases are also tick-transmitted infections.

Around 10% of untreated patients eventually develop a chronic arthritis of the knees, which in half of these leads to severe disability. Cardiac involvement occurs most often in young men, with fluctuating degrees of atrioventricular block or complete heart block occurring over a brief time (3 days to 6 weeks) early in the course of the illness. Neurologic findings include stiff neck, headache, meningitis, Bell palsy, and cranial and peripheral neuropathies, and are much more commonly manifested in European cases. Nonspecific findings include an elevated

sedimentation rate in 50%, and an elevated IgM level, mild anemia, and elevated liver function tests in 20%.

Males and females are equally affected, and the age range most commonly affected is 20-50. Onset of illness is generally between May and November, with more than 80% of cases in the northern hemisphere identified in June, July, or August. In the US, tick transmission of Lyme disease is by *Ixodes scapularis* in the northeast and midwest, *Ixodes pacificus* is incriminated in the west, and in the south disease is transmitted by *Amblyomma americanum.* European cases are transmitted by the tick *Ixodes ricinus.*

The different subtypes of *Borrelia* present in Europe account for the fact that the clinical illness resulting from infection is somewhat different from that seen in the US. European erythema migrans occurs more often in females. It is less likely to have multiple lesions; untreated lesions last longer; there are more laboratory abnormalities in Lyme disease; the arthritis symptoms are prominent in the US but unusual in Europe; and the neurologic manifestations differ. In Europe, infection may lead to Bannwarth syndrome, which is characterized by focal, severe, radicular pains, lymphocytic meningitis, and cranial nerve paralysis. Acrodermatitis chronica atrophicans and some cases of morphea, atrophoderma of Pasini and Pierini, anetoderma, and lichen sclerosus et atrophicus are late cutaneous sequelae *of B. afzelii* or *B. garinii* infection in Europe. Some patients with morphea-type lesions may have histopathologic features of an interstitial granulomatous dermatitis with his- tiocytic pseudorosettes present.

Several cases of transplacental transmission of *Borrelia,* resulting in infant death, have been reported. However, studies of Lyme disease in pregnancy have generally failed to implicate an association with fetal malformations directly.

On histologic investigation there is a superficial and deep perivascular and interstitial mixed-cell infiltrate. Lymphocytes, plasma cells, and eosinophils may be seen, the latter especially prominent when the center of the lesion is biopsied. Warthin- Starry staining may reveal spirochetes in the upper dermis.

The clinical finding of erythema migrans is the most sensitive evidence of early infection. Serologic conversion in the US is as follows: 27% when symptoms present for fewer than 7 days, 41% with symptoms for 7-14 days, and 88% with symptoms longer than 2 weeks. For this reason the diagnosis is made through recognition of erythema migrans. While culture and PCR analysis is specific, it is not sensitive and is not available in most areas. Serologic testing is then the confirmatory test. The screening examination is the ELISA. It is 89% sensitive and 72% specific, so when it is positive or indeterminate, a Western blot is used to confirm the result. False-positive tests occur in syphilis, pinta, yaws, leptospiro- sis, relapsing fever, infectious mononucleosis, and disease associated with autoantibody formation. The VDRL is negative in *B. burgdorferi* infection.

Treatment

The treatment of choice in adults is doxycycline, 100 mg twice a day for 10-30 days. Many authorities recommend at least 3 weeks of treatment. Amoxicillin, 500 mg twice a day for 21 days, or cefuroxime axetil, 500 mg twice a day for 21 days, is also effective. Doxycycline is also effective against *Ehrlichia* while the P-lactams are not. Children under age 9 should be treated with amoxicillin, 20 mg/kg/day in divided doses. Pregnant women with localized early Lyme disease should take amoxicillin; however, if disseminated disease is present, parenteral penicillin G or ceftriaxone is used. Immunodeficient patients may also benefit from intravenous penicillin or ceftriaxone, although the data are not robust for this recommendation.

More aggressive regimens are sometimes necessary for car- ditis and neurologic and arthritic involvement. For Bell palsy, first-degree heart block, and the first course of therapy for arthritis, treatment is a 28-day course of oral doxycycline or amoxicillin. For more severe manifestations in the CNS or heart and for resistant arthritis, parenteral dosing regimens are indicated.

Tick-control environmental measures and personal avoidance strategies are worthwhile when outdoor activities are planned in tick-infested areas. Inspecting for ticks after returning from outdoor activity is a good preventive measure. The tick needs to be attached for more than 24 h to transmit disease in the US. Nymphs are

small; they may be hard to see. Beware of the freckle that moves. Prophylactic antibiotic therapy with one dose of 200 mg doxycycline after a known tick bite with a partially engorged *I. scapularis* in high-incidence areas is 87% effective. An effective vaccine was withdrawn from the market due to poor sales.

Acrodermatitis chronica atrophicans

Also known as primary diffuse atrophy, acrodermatitis chronica atrophicans (ACA) is characterized by the appearance on the extremities of diffuse reddish or bluish-red, paperthin skin. The underlying blood vessels are easily seen through the epidermis. It occurs almost exclusively in Europe.

The disease begins on the backs of the hands and feet, then gradually spreads to involve the forearms, then the arms, and the lower extremities, knees and shins. Occasionally, even the trunk may become involved.

In the beginning the areas may be slightly edematous and scaly, but generally they are level with the skin and smooth. After several weeks to months the skin has a smooth, soft, thin, velvety feel and may easily be lifted into fine folds. It may have a peculiar pinkish gray color and a crumpled cigarette-paper appearance. Well-defined, smooth, edematous, bandlike thickenings develop and may extend from a finger to the elbow (ulnar bands) or develop in the skin over the shins. With progression of the disease, marked atrophy of the skin occurs.

Subcutaneous fibrous nodules may form, chiefly over the elbows, wrists, and knees. They may be single or multiple, and are firm and painless. Diffuse extensive calcification of the soft tissues may be revealed by radiographic examination. Xanthomatous tumors may occur in the skin. Hypertrophic osteoarthritis of the hands is frequently observed. Occasionally, atrophy of the bones of the involved extremities is encountered. Ulcerations and carcinoma may supervene on the atrophic patches. The disease is slowly progressive but may remain stationary for long periods. Patches may change slightly from time to time, but complete involution never occurs.

ACA is a spirochetosis, a late sequel of infection with *Borrelia afzelii.* It is tick-transmitted by *Ixodes ricinus.* Nearly all patients with ACA have a positive test for antibodies to the spirochete, and Warthin-Starry stains demonstrate the organism in tissue in some cases. The organism has been cultured from skin lesions of ACA.

Histologically, there is marked atrophy of the epidermis and dermis without fibrosis. The elastic tissue is absent, and the cutaneous appendages are atrophic. In the dermis a bandlike lymphocytic infiltration is seen, which varies in abundance according to the stage of the disease. The epidermis is slightly hyperkeratotic and flattened, and beneath it there is a distinctive narrow zone of connective tissue in which the elastic tissue is intact.

Antibiotic therapy as for other forms of borreliosis cures most patients with ACA.

Mycoplasma

Mycoplasmas are distinct from true bacteria in that they lack a cell wall and differ from viruses in that they grow on cell-free media. *Mycoplasma pneumoniae* (Eaton agent) is an important cause of acute respiratory disease in children and young adults. It has been estimated that in the summer it may account for 50% of pneumonias.

Skin eruptions occur during the course of infection in approximately 25% of patients. The most frequently reported is Stevens-Johnson syndrome. Erythema nodosum and Gianotti-Crosti syndrome have been occasionally reported, as well as isolated mucositis without any or minimal skin lesions. Other exanthems include urticarial, vesicular, vesiculopustular, maculopapular, scarlatiniform, petechial, purpuric, and morbilliform lesions, distributed primarily on the trunk, arms, and legs. Ulcerative stomatitis and conjunctivitis may be present.

The diagnosis of *M. pneumoniae* infection is made in the acute situation by clinical means, but definitive diagnosis is made by enzyme immunoassay, PCR, or complement fixation techniques. Cold agglutinins with a titer of 1 : 128 or more are usually due to *M. pneumoniae* infection. Occasionally, acrocya- nosis may occur secondary to cold agglutinin disease, which clears with antibiotic therapy.

Treatment is with either a macrolide (erythromycin, azithromycin, or clarithromycin) or doxycycline for 7 days.

Chlamydial infections

Two species of chlamydia, *Chlamydia trachomatis* and *Chlamydia psittaci*, have been recognized. The two species share a major common antigen, and there are numerous serotypes within each species. In humans, *Chlamydia* causes trachoma, inclusion conjunctivitis, nongonococcal urethritis, cervicitis, epididymi- tis, proctitis, endometritis, salpingitis, pneumonia in the newborn, psittacosis (ornithosis), and lymphogranuloma venereum.

Lymphogranuloma venereum

Lymphogranuloma venereum (LGV) is an STD caused by microorganisms of the *Chlamydia trachomatis* group and characterized by suppurative inguinal adenitis with matted lymph nodes, inguinal bubo with secondary ulceration, and constitutional symptoms.

After an incubation period of 3-20 days, a primary lesion consisting of a 2-3 mm herpetiform vesicle or erosion develops on the glans penis, prepuce, or coronal sulcus, or at the meatus. In men who have sex with men the lesion may be in the rectum. In women it occurs on the vulva, vagina, or cervix. The lesion is painless and soon becomes a shallow ulceration. The initial symptom may be urethritis or proctitis. Extragenital primary infections of LGV are rare. An ulcerating lesion may appear at the site of infection on the fingers, lips, or tongue. In patients with HIV infection, a painful perianal ulcer may occur. Primary lesions heal in a few days.

About 2 weeks after the appearance of the primary lesion, enlargement of the regional lymph nodes occurs (Fig. 51). In one-third of cases, the lymphadenopathy is bilateral. In the rather characteristic inguinal adenitis of LGV in men, the nodes in a chain fuse together into a large mass. The color of the skin overlying the mass usually becomes violaceous, the swelling is tender, and the bubo may break down, forming multiple fistulous openings. Adenopathy above and below the Poupart ligament produces the characteristic, but not diagnostic, groove sign. Along with the

local adenitis there may be systemic symptoms of malaise, joint pains, conjunctivitis, loss of appetite, weight loss, and fever, which may persist for several weeks. Cases with septic temperatures, enlarged liver and spleen, and even encephalitis have occasionally been observed.

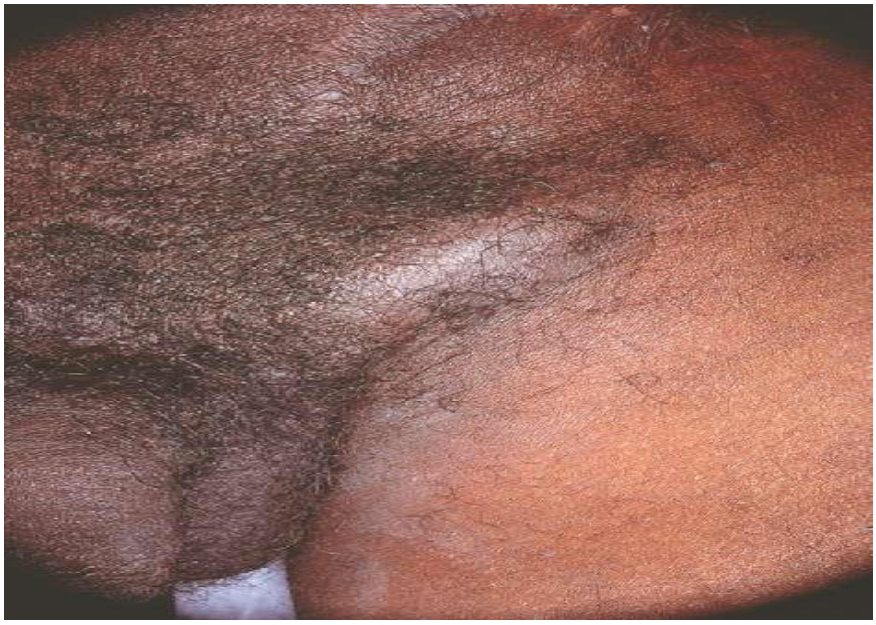


Fig. 51 Lymphogranuloma venereum.

Primary lesions of LGV are rarely observed in female patients; women also have a lower incidence of inguinal buboes. Their bubo is typically pararectal in location. The diagnosis is recognized only much later when the patient presents with an increasingly pronounced inflammatory stricture, which may be annular or tubular, of the lower rectal wall. Because most of the lymph channels running from the vulva drain into the nodes around the lower part of the rectum, an inflammatory reaction in these nodes results in secondary involvement of the rectal wall. The iliac nodes may also be involved.

LGV may start in the rectum as proctitis, which may then progress to the formation of a stricture. The clinical hallmark is bloody, mucopurulent rectal discharge. The stricture can usually be felt with the examining finger 4-6 cm above the anus. Untreated rectal strictures in men and women may eventually require colostomy. With or without rectal strictures, women may in later stages of the

disease show elephantiasis of the genitals with chronic ulcerations and scarring of the vulva (esthiomene). Such a reaction is rare in men.

Cutaneous eruptions take the form of erythema nodosum, erythema multiforme, photosensitivity, and scarlatiniform eruptions. Arthritis associated with LGV involves the finger, wrist, ankle, knee, or shoulder joints. Marked weight loss, pronounced secondary anemia, weakness, and mental depression are often encountered in the course of the anorectal syndrome. Colitis resulting from LGV is limited to the rectum and rectosigmoid structures. Perianal fistulas or sinuses are often seen in cases of anorectal LGV.

Among the various extragenital manifestations that occur are glossitis with regional adenitis, unilateral conjunctivitis with edema of the lids caused by lymphatic blockage with lymphadenopathy, acute meningitis, meningoencephalitis, and pneumonia.

The diagnosis by nucleic acid amplification tests identifies the organism in a wide variety of specimens including urine, urethral, rectal and ulcer swabs, bubo aspirates, and biopsy specimens. The complement fixation test is the most feasible and the simplest serologic test for detecting antibodies in resource-poor locales. These antibodies become detectable some 4 weeks after onset of illness. A titer of 1:64 is highly suggestive. Microhemagglutination inhibition assays are also available and not only confirm the diagnosis but also identify the strain. Three serotypes, designated L1, L2, and L3, are known for the LGV chlamydia. Characteristic surface antigens allow separation of the LGV chlamydias from the agents that cause trachoma, inclusion conjunctivitis, urethritis, and cervicitis, which also belong to the *C. trachomatis* group.

LGV occurs in all races and the highest incidence is found in the 20-40-year-old group. Asymptomatic female contacts who shed the organism from the cervix are an important reservoir of infection. The classic disease in men is uncommon in the US, whereas anorectal LGV is increasing in men who have sex with men.

The characteristic changes in the lymph nodes consist of an infectious granuloma with the formation of stellate abscesses. There is an outer zone of

epithelioid cells with a central necrotic core composed of debris of lymphocytes, and leukocytes. In lesions of long duration, plasma cells may be present. Stellate abscess also occurs in cat-scratch disease, atypical mycobacte- rial infection, tularemia, and sporotrichosis.

As opposed to LGV, with chancroid a primary chancre or multiple chancroidal ulcers are present and may permit the demonstration of *H. ducreyi.* The skin lesions are characteristic and usually much larger and more persistent than the primary lesion of LGV. Donovan bodies are demonstrable in granuloma inguinale; however, inguinal adenitis is not characteristic. Esthiomene may also be seen in both diseases.

If the primary lesion of LGV is well developed, it may be confused with the primary lesion of syphilis. In any genital lesion, darkfield examination for *Treponema pallidum* is indicated if available. Syphilitic inguinal adenitis shows small, hard, nontender glands. It should be emphasized again that all venereal infections may be mixed infections and that observation for simultaneous or subsequent development of another venereal disease should be unrelenting. This includes sero- logic testing for HIV disease. Late stages of LGV esthiomene with ulcerating and cicatrizing lesions have to be differentiated from syphilis by search for spirochetes, the serologic tests for syphilis, and complement fixation tests.

Treatment

The recommended treatment is doxycycline, 100 mg twice a day for 3 weeks. An alternative is erythromycin, 500 mg four times a day for 21 days. Sexual partners within the prior 30 days should also be treated. The fluctuant nodules are aspirated from above through healthy adjacent normal skin to prevent rupture.

TEST

1. The skin is develops from these following germ layers:

* ecto- and mesodermal

mesoderm

enteroderm

ectoderm

2. The weight of the skin without hypodermis is include:

15% of body weight

* 5% of body weight

20% of body weight

There is not correct answer

3. The area of the skin is cover:

* 1.5 - 2 sq. m

3.5 - 4 m

4.5 - 5 m

4. During the day, with the surface of the skin evaporates:

* 600 - 800 ml of water vapor

50 - 100 ml of water vapor

200 - 300 ml of water vapor

1000 - 1500 ml water vapor

5. The sebaceous glands secretes in a week:

* 100 - 200 gr. sebum

10 - 50 gr. sebum

300 - 400 gr. sebum

500 - 600 gr. sebum

6. In the epidermis approximately separates:

* 3 layers

4 layers

5 layers

6 layers

7. In the epidermis layers are distinguished, except:

Basal layer

Suprabasal layer

granular layer

* reticulat layer

8. Proliferative cells of the epidermis are include:

* basal cells

lymphocytes

Macrophages

mastocytes

9.Normal dermographism is:

white

*red

mixed

absent

10. what feels Vater – Paciniand Golgi – Mazzoni bodies:

* feeling of a deep pressure

feeling the heat

feeling cold

pain

11. What feels tactile corpuscle of the Meysner:

* tactile sensitivity

feeling cold

pain

not involved in the perception

12. What feels Ruffini corpuscles:

*heat

pain

sense of balance

feeling cold

13. What feels glomeruli Krause:

* feeling cold

pain

a deep sense of pressure

feeling the heat

14. bristling hair localized everywhere except:

* beard and mustache

field brow

edges of the eyelids

nasal vestibule

15. The outcome of a blister:

erosion

ulcer

spot

* disappears without a trace

16. An ulcer is:

skin defect within the epidermis

* deep skin defect

Changing of the color of the skin

slight thickening of the skin

17. What are the primary morphological elements came from the papillary layer of the dermis:

*blister

epidermal papule

bullas

surface pustule

18. Polymorphic lesions occur in diseases like, except:

* Psoriasis

Lichen planus rubra

molluscum contagiosum

secondary syphilis

19. follicular pustules are listed below, except:

osteofolliculitis

folliculitis

furuncle

*impetigo

20. After opening the vesicules is formed:

vegetation

ulcer

squama

*erosion

21. parakeratosis is typical for:

* Psoriasis

Lichen planus rubra

simple bullas stripping

secondary syphilis

22. acantholysis is typical for:

shingles

scarring pemphigoid

dermatitis Duhring

* acantholytic pemphigus

23. Spongiosis typical for:

* Eczema

pemphigus

simple bullas stripping

skin tuberculosis

24. granulosis typical for:

psoriasis

* lichen planus rubra

true eczema

furuncle

25. papillomatosis is typical for:

molluscum contagiosum

* vulgar warts

Lupus eritramatosis

zoonotic form microsporia

26. Lotions are prescribed for:

Hyperkeratosis

* acute inflammation to get wet

Squamation

itching

27. Disinfectants are:

corticosteroids

*boric acid

zinc oxide

menthol

28. Subcutaneous adiponecrosis is develops from:

* 1-2 weeks of life

1-2 months of life

in the second year of life

after puberty

29. streptoderma affected:

*smooth skin

hair follicles

sebaceous glands

sweat glands

30. hydradenitis cause:

* staphylococci

streptococci

Pseudomonas aeruginosa

mixed infection

31. Vulgar Sycosis differentiate with:

lupus erythematosus

psoriasis

* parasitic sycosis

eczema

32. Gidrodenit - an inflammation:

* apocrine glands

sebaceous follicles volosiny

eccrine glands

Breast

33. Superficial staphilodermatitis is:

* ostiofollikulit

folliculitis

furuncle

hydradenitis

34. The primary lesions of the streptococcal impetigo is:

pustule

* flictenas (flaccid bladder)

blister

nodule

35. vulgar impetigo cause:

streptococci

staphylococci

* mixed infection

viruses

36. What are the morphological lesion is typical for the herpes simplex virus:

* blisters, erosion, crust

nodules, scales

nodules, blisters

abscesses, ulcers

37. primary lesion of the contagious mollusk:

*papule

tubercle

vesicle

blister

38. Ways of infection genital warts:

*sexual

transfusing

close household contact

airborne

39. The infection in a child should take the following actions:

* Isolation of healthy children

Hormone Therapy

Ultrasound of internal organs

Antibiotic treatment

40. Cause of the scabies:

virus

protozoa

* Parasites

bacteria

41. In what layer of the skin the female mite lays itch move:

in shiny

in granular

* in the stratum corneum

in the suprabasal

42. The most frequent length of the incubation period for scabies:

* 5-12 days

21 day

6 weeks

4 months

43. Clinic of the Scabies characterized by the following morphological lesions:

lenticular papules

tubercles

* paired pruritic nodules and blisters

nodule

44. Symptoms Gorchakov-Hardy, Michaelis, Sezary detected in:

Scabies

lice

leishmaniasis

acne vulgaris

45. Symptom Gorchakov-Hardy - is:

* purulent and bloody crusts in the elbow

bloody crusts in the gluteal folds

itchy, worse in the evening

excoriations due to scratching

46. Specify the most frequent complications of scabies:

sepsis

* secondary pyoderma

eczema

dermatitis

47. On the basis of the method of laboratory diagnosis is established the final diagnosis "scabies":

sowing on fertile ground

REEF

PCR

*microscopy

48. Definitive diagnosis of scabies is the main criterion is :

itch

availability scratching

* detect scabies mite

blistering

49. What are the medicines used to treat head lice:

flutsinar

Neo-Penotran

* nittifor

Augmentin

50. Complications of head lice:

* pyoderma

alopecia

allergic reactions

temperature increase

51. Pubic lice can be transmitted in:

in the bath

* during sexual intercourse

when visiting the pool

on the beach

52. The source of infection zoonotic microsporia:

Rodents

* cats, dogs

cows, horses

birds

53. The source of chronic infection trichophytosis:

cats

*people

birds

calves

54. Superfecial trichophytosis common in:

milkmaid

*children

adult men

farm workers

55. rubromikoza causative agent is:

* Trichophyton rubrum

Epidermophyton floccosum

Corynebacteria minutissima

Pityrosporum orbiculare

56. anthroponotic microsporia causative agent is:

* Microsporum ferrugineum

Microsporum lanosum

Trichophyton schonleinii

Trichophyton violaceum

57. The causative agent is Trichophyton antropofilnymi:

* Trichophyton violaceum

Trichophyton rubrum

Trichophyton verrucosum

Microsporum ferrugenii

58 agents of parasitic sycosis is:

Trichophyton rubrum

Trichophyton Schoenleini

* Trichophyton gypseum

Trichophyton violaceum

59. The luminescence in the survey using a Wood's lamp is detected in patients with:

* zoonotic microsporia

surface trichophytosis

crusted ringworm

infiltrative-suppurative trichophytosis

60. At a height of 5 to 8 mm above the hairs break off at the skin:

trihofitii

* microsporia

crusted ringworm

alopecia areata

61. Smooth skin microsporia is not typicalfor:

Presence of the erythematiuos-squamous area

* fuzzy boundaries and fast healing

Squamation

vesicules around the edge of the focus

62. For favus is typical:

the presence of crusts

* brittle hair and papuleformation

scarring

atrophy of the hair

63. For Trichophyton of the Fold are not typical:

infiltration

brick-reddish color

corral-red glow when Luminescence

* papular lesions

64. For Trichophyton Rubra are typical:

acanthosis

* hyperkeratosis

spongiosis

parakeratosis

65. For the topical treatment of fungal infections do not apply:

mikoseptin

Lamisil

clotrimazole

* prednisolone

66. Treatment of the Erythrasma are carry out by:

* erythromycin ointment

oxolinic ointment

toxoids

Oksikort

67. Balzer test is positive for:

candidiasis

athlete's foot

* Tinea versicolor

Trychophyton Rubra

68. Candidiasis of the skin and mucous are causes by:

Trichophyton rubrum

* Candida albicans

Corynebacteria minutissima

Pityrosporum orbiculare

69. The causative agent of tinea versicolor are:

* Pityrosporum orbiculare

Corynebacterium minutissimum

Epidermophyton floccosum

Trichophyton mentagraphytes var interdigitale

70. The main type of allergic response in the skin vasculitis are:

anaphylactoid

cytotoxic

* immunocomplex

and cytotoxic anaphylactoid

71. Vasculitis are divided into:

* to the superfecial and deep

infectious and noninfectious

infectious and medicinal

inherited and acquired

72. In the hemorrhagic vasculitis of the skin, are affected:

nervous system

* vessels of internal organs

articular cartilage

endocrine system

73. itching dermatosis does not include:

hives

neurodermatitis

pruritus of the Gebre

* pink zoster Gibert

74. The morphological lesion that typical for the child pruritus:

blister

nodule

microvesicles

* seropapula

75. What lesions appears in the urticarial:

papules

* blisters

Vesicles

Bulla

76. Location of the primary lesionin the urticaria:

* in the papillary layer of the dermis

in the stratum corneum of the epidermis

in the granular layer of epidermis

in hypodermis

77. What dermographism are investigates urticaria in the patients:

*red

white

mixed

dermogrfizm are not appear

78. Bullous dermatoses does not apply:

pemphigus vulgaris

bullous pemphigoid

herpetiformis dermatosis

* pemphigus of the newborns

79. Bullous dermatosis, in which bulles usually start in the oral mucosa:

* pemphigus vulgaris

familial pemphigus

syphilitic pemphigus

Duhring-Brock disease

80. acantholytic pemphigus group does not include:

vulgar

seborrheic

vegetating

* Familiar

81. Levels of lying of the bulla with respect to the epidermis in the pemphigus are:

* intraepidermal

subepidermal

intradermal

intraepidermal

82. vulgar pemphigus are investigate in the:

* IgG deposition in the intercellular substance and thorny layer cells

IgG deposits in the basal membrane

immune complex deposition beneath the basement membrane

green light (Wood's lamp)

83. The skin around the bullas in the pemphigus:

hyperemic

* is not changed

infiltrated

purplish tone

84. To get the symptoms of asbestos-Hansen should:

* press the bullas

open top of the bullas

Pull top of the bullas

rub between bullas

85. For the treatment of pemphigus apply:

antibiotics

* glucocorticoid hormones

iron supplements

antihistamines

86. Seborrheic pemphigus includes the following symptoms:

* lupus, seborrheic dermatitis and pemphigus

Lichen planus rubra, vasculitis and pemphigus

lupus erythematosus, dermatomyositis, and pemphigus

scleroderma, psoriasis and pemphigus

87. Pemphigus is differentiate from dermatitis Dühring with:

severe itching

tense of the bulla

grouping bullas

* positive sign of Nikolsky

88. Polymorphism of the lesion are typical for:

pemphigus vulgaris

bullous pemphigoid

* Duhring disease

Leaf like-pemphigus

89. dermatosis, which a diagnostic significance with a positive test of iodine:

pemphigus vulgaris

* dermatitis Duhring

bullous pemphigoid

familial pemphigus

90. Laboratory tests for the diagnosis of disease Dühring are:

* eosinophilia in the blood and bullous fluid

Ttsanka cells in smears prints from the bottom of erosions

Sezary cells

a symptom of a ladies' heel

91. Except the skin at the scarring pemphigoid are affected:

skin folds

scalp

* conjunctival mucosa

nail plate

92. What primary lesions observed in psoriasis:

* papule

blister

bullas

tubercle

93. Symptom Pilnova in psoriasis are:

* bright red color of the papules

atrophic ring around papules

isomorphic skin reaction

desquamation in the center of papules

94. When heelpiece (heeling) of the papules in psoriasis are observed:

a symptom of a hidden desquamation

* psoriatic triad phenomena

a symptom of a ladies' heel

symptom "cobblestones"

95. What is the morphological basis of the phenomenon of "terminal membrane":

acantholysis

spongiosis

* acanthosis

ballooned degeneration

96. Positive isomorphic Koebner reaction is:

* the appearance of fresh papules at the site of injury in 7-14 days

the phenomenon of "stearin spot"

the phenomenon of "hidden desquamation"

Voronov rings

97. In the treatment of psoriasis do not apply:

hyposensitizing drugs

sedatives

vitamins

* antivirals

98. Polygon shiny papules with Umbriacal like impression observed at:

*Lichen Planus Rubra

psoriasis

secondary recurrent syphilis

secondary fresh syphilis

99. Pathological changes in lichen planus rubra:

* hypergranulesis

Akantolisis

swelling of the papillary layer of the dermis

endo-, meso-, periarteritis

100. Grid Wickham observed at:

* Lichen planus rubra

discoid lupus erythematosus

psoriasis

centrifugal erythema of Biett

102. lichen rosacea is localized mainly on:

scalp

shins

* the body, along the lines of skin tension

feet

103. For the treatment of lichen rosacea it is advisable to appoint:

* allergen therapy

hormones

antifungal antibiotics

lidase

104. Specify obligate precancerous disease:

Bowen's disease

* xeroderma pigmentosum

leukoplakia

Keira erythroplasia

105. The basal cell carcinoma is more often localized on:

palms

* Facial

trunk

hips

106. In chronic lupus eritematosis affected:

kidneys

liver

C.N.S

*skin

107. centrifugal erythema characterized by:

*erythema

follicular hyperkeratosis

atrophy

108. Currently lupus eritematosis relate to the:

infectious diseases

* autoimmune diseases

viral diseases

sexually transmitted diseases

109. For the topical treatment of lupus eritematosis apply

antibiotic ointments

* steroid ointment

salicylic ointment

antifungal ointment

110. discoid lupus erythematosus ends with:

* scarring

pigmentation spots

pass completely

transformed into lymphoma

111. For dermatomyositis is characterized by:

muscle hypertrophy

hemosiderosis

* kreatinuriya

anemia

112. For the treatment of localized scleroderma are used:

Lotion

UFO

*paraffin

PUVA - therapy

113. plaque of the scleroderma ends with:

* scar atrophy

pigmentation spots

pass completely

joining a secondary infection

114. Primary lesion of the tuberculosous lupus are:

* tuberculums

ulcers

nodules

papules

115. For the treatment of dermatomyositis is used:

* Corticosteroids

calcium supplements

tranquilizers

antistaphylococcal immunoglobulin

116. papule - necrotizing tuberculosis differentiate from:

exudative erythema multiforme

* pruritus

psoriasis

skrofulodermy

117. Skrofuloderma often localized:

* neck area

groin

hips

trunk

118. Verrucose tuberculosis are often localized at:

trunk

* back of the hand

scalp

palms

119. The diagnosis of tuberculosis of the skin is put on the basis of:

tuberculin tests

skin biopsies

fluorography of lungs

* All the above methods are correct

120. Tuberculosis of the skin are treated with:

penicillin

tetracycline

* rifampicin

gerpevir

121. Erythema nodosum of Bazin is localized on:

the face

trunk

* legs

scalp

122. The source of infection of old world type of leishmaniasis are:

sick cats

* Rodents

cattle

sick people

123. The sources of contamination new world leishmaniasis type are:

Rodents

cattle

*sick people

cats, dogs

124. Carriers Leishmania are:

* Mosquitoes

sick animals

sick people

Rodents

125. Leishmaniasis clinic is typical for:

tubercle

ulcer

scar

* All the above mentioned are correct

126. Treatment of leishmaniasis are used:

hormones

* Antibiotics

sulfa drugs

antifungals agents

127. The causative agent of leprosy:

protozoa

* mycobacteria

Spirochetes

Viruses

128. The incubation period for leprosy include:

a few days

a few months

*some years

few hours

129. Mycobacterium leprae looking for:

in sputum

in fecal masses

* in scrapings from the nasal mucosa

urine

130. lepromatous type of leprosy differentiates from:

psoriasis

lichen planus rubra

* gummy syphilides

Lichen rosacea

131. In the base of eczema are highlights histopathological changes:

parakeratosis

* spongiosa

Akantolizis

Vegetation

132. For Vitiligo is typical primary lesions:

papule

blister

* depigmentation spot

Nodule

133. The causative agent of syphilis:

* Treponema pallidum

Treponema balanitidis

Treponema pertenue

Treponema caratea

134. Treponema pallidum has been discovered:

in 1901year

1889 year

* in 1905 year

1926 year

135. The duration of the division of pathogenic Treponema pallidum is including:

6-8 hours

10-12 hours

15-20 hours

* 30-33 hours

136. The length of Treponema pallidum approximately include:

* 6-20 microns

50-60 microns

30-40 microns

40-50 microns

137. The incubation period for syphilis is shortened in:

In drug users (narcomoniac)

* in young, physically healthy people

in individuals with immunodeficiency

after taking antibiotics

138. Headless syphilis is possible in:

* in blood transfusion patient

Late congenital syphilis

indefective preventive treatment

the presence of extragenital chancre

139. After contact with patience syphilis, hard chancre appears within:

1 week

2 weeks

*4 weeks

6-7 weeks

140. What period begins "transfusion" Syphilis:

primary

* with secondary

Tertiary

with congenital

141. The scar after healing of the chancre is called:

Cain printing

* seal the devil

chancre-print

stellate

142. What is the re-infection of syphilis:

* reinfection

superinfection

Jarisch-Herxheimer-Lukashevich response

immunoblotting

143. Wasserman reaction after infection with syphilis will be positive within:

3-4 weeks

* 6-8 weeks

9-12 weeks

24 years

144. The most specific serologic test for syphilis is:

immunofluorescence

* immobilization reaction treponem

Wasserman reaction

microreaction

145. The reaction of immobilization treponema palidium is made purpose of:

confirm the diagnosis of primary syphilis

* confirm the diagnosis of latent syphilis

confirm the diagnosis of secondary syphilis fresh

to monitor of treatment

146. The increase in regional lymph nodes after the appearance of the chancre is usually observed within:

1^{st} -2^{nd} days

* 5^{th}-8^{th} days

9^{th}-12^{th} days

13^{th}-16^{th} days

147. The main drugs for the treatment of patients with syphilis are include:

* penicillin drugs

Tetracycline drugs

drugs erythromycin

macrolides

148. To the side effects in the treatment of syphilis with penicillin are all listed, except:

anaphylactic shock

toksidermia

candidiasis

* alopecia

149. The secondary period of syphilis begins from the moment of infection within:

2 weeks

2 months

*3 months

6 months

150. Secondary syphilides of the mucous membranes:

Occurs rare

* Observed in the form of a papules andspotty rash

Have a fuzzy boundaries

Not very contagious

151. After the appearance of hard chancre of syphilis in a second period occurs, approximately within:

5-6 weeks

6-7 weeks

* 6-8 weeks

8-9 weeks

152. The differential diagnosis of papular syphilides should be carried out with all the listed diseases, except:

Lichen planus rubra

guttate parapsoriases

* leaf form pemphigus

follicular hyperkeratosis

153. Wide warts appear:

* During the secondary recurrent syphilis

Two weeks after infection

1 month after infection

the primary seropositive period

154. Wide condylomas must be differentiated from:

* genital warts

Tinea versicolor

Lichen rosacea

Urticarial

155. "Crown of Venus" - is:

syphilitic alopecia

syphilitic leukoderma

* papules on the edge of the growth of hair on the head

papules on the genitals

156. Syphilitic leukoderma occurs:

* 6 months. after infection

in the incubation period

2 weeks after infection

in primary seronegative period

157. "necklace of Venus" - is:

syphilitic alopecia

* syphilitic leukoderma

papules on the edge of the growth of hair on the head

paraphimosis

158. Syphilitic alopecia occurs:

* in the secondary period

in the incubation period

After 2 weeks after infection

in primary seronegative period

159. Symptom Pincus observed in syphilitic involvement of the:

mucous

skin

*hair

Nails

160. Omnibus syphiloderm - is:

step-like eyelashes

* loss of the lateral ends of the eyebrows and eyelashes

papules on the edge of the growth of hair on the head

variety ofpustular syphilides

161. Most of secondary syphilides heels without treatment within:

* 1-2 months

2-3 months

3-4 months

4-5 months

162. visceral syphilis most often affects:

kidneys

mesostenium

*aorta

lungs

163. The Jarisch-Herxheimer-Lukashevich response in syphilis - is:

* acute reaction after the start of antibiotic therapy

regional lymphadenitis

polyadenylation

RIBT

164. Forms of latent syphilis are include all listed, except:

Late

unknown

unspecified

* seronegative

165. contribute to the development of tertiary syphilis:

alcoholism

immunodeficiency states

severe comorbidities

* all answers are correct

166. Scars at tuberculum syphilides could be:

atrophic

* Mosaic

Bridge-like

Stamped

167. Roseola Fournier as a manifestation of syphilis is found in:

primary seronegative period

secondary recurrent period

primary seropositive period

* Tertiary period of syphilis

168. The basis tuberculus and gummy syphilides are include:

dyskeratosis

gipergranulez

Epidermolysis

* infectious granuloma

169. Tuberculum of syphiloderm should be differentiated with all listed diseases, except for:

Skin tuberculosis

leishmaniasis

Leprosy

* Eczema

170. gummy damage on the skin should be differentiated with all listed diseases, except for:

skrofulodermy

trophic ulcers

Chronic ulcers of pyoderma

* parapsoriasis

171. There are all of these outcomes gummy syphilides except:

scar atrophy

* resorption without a trace

Necrosis

ulceration

172. Tertiary syphilis is characterized by all the above except:

limitations of the involvement

focus like location of the lesions

tendency to necrosis

* bright coloring of the lesions

173. reliable signs of late congenital syphilis:

syphilitic rhinitis

high "Gothic" palate

* Hutchinson's teeth

syphilitic pemphigus

174. The clinical signs of congenital syphilis in infants are not include:

saddle nose

scars Robinson-Fournier

fruit like skull

diffuse alopecia

* All of the above are correct

175. Late congenital syphilis develops within:

in late pregnancy

under the age of 1 year

under the age of 2 years

* after 2 years of life

176. Late congenital syphilis is characterized by:

Gunma palate

* parenchymal keratitis

Skin tubercules of the body

skin roseola of the body

177. Manifestations of late congenital syphilis occur in the age:

* after 2 years

from 4 to 17 years

from 17 to 20 years

from 20 to 23 years old

178. Early congenital syphilis appears between:

* from birth to 2 years

2 to 3 years

3 to 4 years

from 4 to 5 years

179. Syphilis of the infants is manifested in aged:

1 to 4 months

* from birth to one year

from birth to 2 years

28 days

180. The causative agent of chancroid:

Treponema pallidum

* Streptobacilus Ducrei

Chamidia trachomatis

Gardnerella vaginalis

181. 4th venereal disease is caused by:

virus

streptococcus

* Chlamydia

spirochete

182. The incubation period of the venereal lymphogranulema is:

1 day

1-2 weeks

* 3-4 weeks

5-6 weeks

183. The most accessible to involvement of gonococci are mucous membranes, listed above:

Multilayer flattened unkeratinized epithelium

transitional epithelium

* columnar epithelium

Multilayer flattened keratinized epithelium

184. There are the following clinical forms of gonorrhea, except:

fresh acute

fresh subacute

fresh torpid

* latent

185. The duration of the incubation period for acute gonorrhea is often equal:

1-2 days

* 3-4 days

5-7 days

8-10 days

186. The most frequent cause of recurrence gonorrhea an association withgonococci is include:

Chlamydia

Mycoses

* Trichomonas

Ureaplazm

187. What are the medium are used to culture research for gonorrhea:

Saburo

agar-agar

* ascites-agar

meat-peptone

188. Fresh acute anterior gonorrheal urethritis is characterized by all of the above features, except:

Plentiful purulent discharge

pain when urination

hyperemia of sponges meatus

* the presence of purulent filaments in the 1st and 2nd urine portions

189. Chronic total gonorrheal urethritis is characterized by the following features, except:

Stasis hyperemic mucosa color sponges meatus

drops "good morning"

presence of a minor amount of purulent filaments in the 1st and 2nd urine samples

* the presence of purulent threads in 1 st portion of urine

190. The treatment of chronic gonorrhea include:

immunotherapy

etiological treatment

local treatment

* All of the above are correct

191. Methods for local treatment of urethritis include all of the above except:

instillations

* mikroklizm

bougienage

tamponade

192. STI not include:

Chlamydia

*trichinosis

trichomoniasis

genital herpes

193. What are the causative agent of trichomoniasis:

Treponema pallidum

* Trichomonas vaginalis

Haemophillus Ducrei

Chlamidia trachomatis

194. Specify the current form of urogenital trichomoniasis:

acute

chronic

torpid

* all answers are correct

195. What are the drug of choice for treatment of urogenital trichomoniasis:

doxycycline

azithromycin

* Metronidazole

ketoconazole

196. Specify the pathogen of the Mycoplasma infection:

* Mycoplasma hominis

Trichomonas vaginalis

Trichophyton rubrum

Microsporum canis

197. The causative agent of urogenital chlamydia is:

Treponema pallidum

Chlamydia trachomatis *

Trichomonas vaginalis

Streptobacilus Haemophillus Ducrei

198. The cycle of development of chlamydia is include:

8-12 hours

2-3 days

*21 day

4-6 months

199. What forms of chlamydia infections are:

reticular cells

* elementary bodies

intermediate (transitional) calf

chlamydial inclusions

200. What material is taken for investigation by PCR on chlamydia:

discharge from the urethra, cervix

* scrape from the urethra, cervix

blood

vaginal discharge

201. Set your:

A) Stafilodermiya

B) strepto-stafilodermiya

a) folliculitis

b) gangrenous pyoderma

c) hydradenitis

g) Chronic deep ulcer-vegetating pyoderma

* A-a, a; B-b, d

A, b; B-c, d

Oh, g; B-b,

A, b, c; B-a, d

A-c, d; B-a, b

202. Set your:

A) hydradenitis

B) Vezikulopustulez

B) Furuncle

a) purulent inflammation of the apocrine sweat glands

b) necrotic lesion of the follicle and surrounding tissue

c) purulent inflammation of the sweat gland ekkrinnoy

* Ah; B-B; B-B

A B; B-A; The in-

Ah; B-B; The in-

A-b; B-B; At-a

A-B; B-A; B-B

203. Set your:

A) Sycosis

B) Periporit

B) Furuncle

a) Chronic inflammation follicles in growth zone short thick hair

b) necrotic lesion of the follicle and surrounding tissue

c) purulent inflammation of the sweat gland ekkrinnoy

*Ah; B-B; B-B

A B; B-A; The in-

Ah; B-B; The in-

A-b; B-B; At-a

A-B; B-A; B-B

204. Set your:

A) Zayed

B) Paronychia surface

B) Psevdofurunkulez

a) strep impetigo in the corners of the mouth

b) milliarnye multiple abscesses in children

c) defeated roller nail

*Ah; B-B; B-B

A B; B-A; The in-

Ah; B-B; The in-

A-b; B-B; At-a

A-B; B-A; B-B

205. Set your:

A) Zayed

B) Paronychia surface

B) Psevdofurunkulez

a) strep impetigo in the corners of the mouth

b) milliarnye multiple abscesses in children

c) defeated roller nail

*Ah; B-B; B-B

A B; B-A; The in-

Ah; B-B; The in-

A-b; B-B; At-a

A-B; B-A; B-B

206. Set your:

A) Surface streptoderma

B) Deep streptoderma

a) impetigo

b) Zayed

c) ecthyma

d) lichen simplex

*A, b, g; Bv

A, b; B-c, d

Oh, g; B-b,

A, b, c; B-a, d

A-c, d; B-a, b

207. Set your:

A) Surface streptostafilodermii

B) Deep streptostafilodermii

a) impetigo vulgar

b) chronic ulcerative pyoderma

c) ulcer-vegetating pyoderma

d) shankriformnaya pyoderma

*Ah; B-b, c, d

A, b; B-c, d

Oh, g; B-b,

A, b, c; B-a, d

A-c, d; B-a, b

208. Set your:

A) The defeat of the hair follicles

B) The defeat of the sweat glands

a) ostiofollikuit

b) vezikulopustulez

c) hydradenitis

g) boil

* Ah, g; B-b,

A, b; B-c, d

A-a, a; B-b, d

A, b, c; B-a, d

A-c, d; B-a, b

209. Set your:

A) Impetigo

B) hydradenitis

a) conflict

b) assembly

c) honey cake

d) a symptom "of bitch udder"

*A-a, a; B-b, d

A, b; B-c, d

Oh, g; B-b,

A, b, c; B-a, d

A-c, d; B-a, b

210. Set your:

A) Vezikulopustulez

B) hydradenitis

a) inflammation of the sweat glands mouths merokrinnyh

b) the disease of newborn

c) inflammation apocrine sweat glands

g) Adult disease

* Ah, b; B-c, d

A-a, a; B-b, d

Oh, g; B-b,

A, b, c; B-a, d

A-c, d; B-a, b

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CONTENT

O‘QUV QO‘LLANMA

ADKHAMJON PAKIRDINOV
KAMOLIDDIN SALAXIDDINOV

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ANDIJON DAVLAT TIBBIYOT INSTITUTI

GUVOHNOMA

ANDIJON – 2023

O‘QUV ADABIYOTINING NASHR RUXSATNOMASI

O‘zbekiston Respublikasi Oliy ta’lim, fan va innovatsiyalar vazirligi Andijon davlat tibbiyot instituti rektorining 2023 yil “1” maydagi “280-Sh”–sonli buyrug‘iga asosan

A.B.Pakirdinov, K.Z.Salaxiddinov
(muallifning familiyasi, ismi-sharifi)

Davolash ishi-5510100
(ta’lim yo‘nalishi (mutaxassisligi)

_____
_____ ning
talabalari (o‘quvchilari) uchun tavsiya etilgan.

Pustular skin deseaes
nomli o‘quv qo‘llanmasi
(o‘quv adabiyotining nomi va turi: darslik, o‘quv qo‘llanma)

_____
_____
_____ ga

O‘zbekiston Respublikasi Vazirlar Mahkamasi tomonidan litsenziya berilgan nashriyotlarda nashr etishga ruxsat berildi.

O‘ZB. RESP. SOG‘LIQNI SAQLASH VAZIRLIGI ANDIJON DAVLAT TIBBIYOT INSTITUTI

Rektor _____ M.M. Madazimov
(imzo)

Ro‘yxatga olish raqami:
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