Erysipelas: a common potentially dangerous infection

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SUMMARY

Erysipelas is an acute superficial cutaneous cellulitis that commonly occurs not only in elderly and immunocompromised persons, but also in neonates and small children subsequent to bacterial inoculation through a break in the skin barrier. Group A Beta-hemolytic streptococcus (GABHS, *Streptoccocus pyogenes*) is the usual etiologic agent. Factors that predispose pediatric patients to the development of erysipelas include very young age, diabetes mellitus, an immunocompromised state, and nephrotic syndrome. Patients typically have a well-demarcated, erythematous, indurated, rapidly spreading patch with a palpable advancing border on the face or extremities. Fever with chills and general malaise may be prominent symptoms. Antibiotics are usually effective. Patients handled in a timely manner tend to recover without problems. However, potential complications include abscess formation, necrotizing fasciitis, septicemia, recurrent infection, and lymphedema.

KEY WORDS

erysipelas, streptococcal infection, review

Introduction

This disease occurs commonly in old and immunocompromised individuals as well as in neonates and small children. The infection affects epidermis and superficial dermis of the face, legs, and other sites and may also involve the lymphatics. In 1882 Fehleisen proved that streptococcus had invaded the lymphatics and was transmissible to other persons (1). Erysipelas was known as St. Anthony's Fire during the 17th century (2). This disease was attributed to the ingestion of rye bread contaminated by fungus, and was associated with hallucinations and vomiting. It was so named because it was believed that only St. Anthony, an Egyptian monk, could cure it (3).

Today erysipelas occurs more commonly in individuals at the extremes of age and in the immunocompromised (1). It most often affects the superficial dermis of the face or legs (4, 5). Group A beta-hemolytic streptococcus (GABHS) is the most common etiologic agent; others include Group B, C, and G Streptococci and a variety of other bacteria (5, 6). Much feared and often fatal in the pre-antibiotic era, it responds well to antibiotics and usually resolves fully without complications (7, 8). However, recurrence may occur, especially in those with predisposing conditions (9, 10).

Epidemiology

Although the incidence of erysipelas has been on the rise since the 1980s, it tends to affect individuals

rather than populations. Few epidemics have been reported (11). Erysipelas occurs equally across racial groups and can affect individuals of all socioeconomic backgrounds (3, 4). The incidence of erysipelas shows a bimodal distribution with a peak among young children and the elderly. There is also an increased risk in the immunocompromised, including patients with a history of recent chemotherapy, corticosteroid use, or HIV infection. The mortality rate is less than 1% in patients receiving appropriate treatment (12).

Pathogenesis and etiology

The pathogenesis of erysipelas begins with a disruption of the skin barrier, allowing the infective agent to enter. Skin disruption occurs most commonly with abrasion, herpes simplex virus infections, interdigital tinea pedis, or other trauma, but may also result from insect bites, ulcers, puncture wounds, post-vaccination, or exposure of a neonate's umbilical stump (9). The nasopharynx in bacterial carriers is a common source of inoculation. However, primary inoculation may occur as well (2, 3).Once the skin is inoculated, infection spreads rapidly and may show extensive lymphatic involvement evidenced by red streaks radiating over the involved skin. Marked lymph node enlargement and tenderness may also be present (13, 14).The most common cause of erysipelas is GABHS, followed by Groups B, C, and G Streptococci. Rarely, *Staphylococcus aureus* may be the cause. In immunocompromised patients, or those that show no improvement with standard antibiotic therapy, other etiologic agents of erysipelas should be considered. In addition to *Staphylococcus aureus,* these include *Streptococcus pneumoniae*, *Klebsiella pneumoniae*, *Yersinia enterocolitica,* and *Haemophilus influenzae* (15).

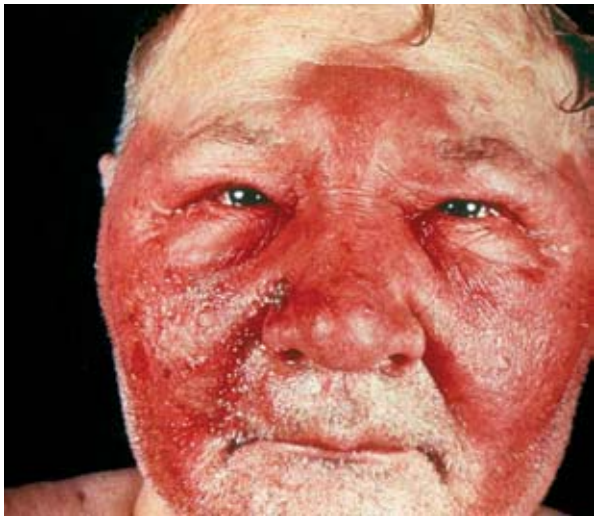

Figure 1: 68-year-old man with a well-demarcated erythematous patch on the central face with indurated advancing borders.

Clinical features

Patients with erysipelas typically have a small erythematous patch that rapidly becomes bright red, edematous, indurated, and shiny with well-defined, slightly raised borders, well-demarcated from surrounding skin (16, 17). Figure 1. It is most commonly seen on the central face and legs. The infection shows rapid, irregular, lateral spread over a few days and can further progress to a more severe infection with bullae formation and severe necrosis (18). In the case of the newborn, the affected area is often periumbilical with erythema spreading along the abdominal wall. The patient or parent may have had a preceding upper respiratory infection.Upon physical examination, the area involved will be tender to palpation and warm to the touch with lymphangitic streaks and lymphadenopathy. These physical findings are often accompanied by a prodrome of fever, chills, and general malaise. Patients with a more advanced infection may be toxic and require aggressive intervention and infection control (19).

Laboratory findings and imaging

The diagnosis of erysipelas is largely based on clinical findings. However, certain diagnostic tests may be useful in differentiating it from other disorders. A complete blood count with differential might demonstrate leukocytosis and a left shift, but may be normal, especially in the immunocompromised (20).Needle aspiration may be performed, and the aspirate cultured. Swab culture of the nasopharynx may aid in isolating an etiologic pathogen. Blood cultures are of limited use and are reserved for when bacteremia is suspected because they are positive in only 5% of cases (20). MRI and CT may be useful for detecting deeper infection. However, these studies are rarely performed (21).

Histopathology

Histological analysis shows a mixed interstitial infiltrate mainly of neutrophils within a markedly edematous dermis. Lymphatics and capillaries are dilated. This infiltrate may involve the entire dermis and sometimes extend into subcutaneous fat. Giemsa or Gram stain may show streptococci in the tissue and within the lymphatics. Recurrent erysipelas may demonstrate fibrotic thickening of lymphatic vessel walls, sometimes with lumi-

Table 1: Pyoderma types.

Infection	Presenting symptom(s)	Infectious agent & treatment
Impetigo contagiosa	Small clusters of vesicles around the nose and mouth, hands, and forearms that burst to form honey colored crusts	GABHS Staphylococcus aureus Treatment: topical mupirocin ointment or oral antibiotics
Erysipelas	Bright red, edematous, indurated shiny plaque with well-defined, raised borders on the face or extremities	Primarily GABHS Treatment: oral penicillin or erythromycin in allergic patients
Ecthyma gangrenosum	Range from erythematous macules to pustular macules with surrounding erythema, to hemorrhagic bulla with surrounding erythema	Treatment: antipseudomonal penicillins in conjunction with an aminoglycoside (gentamicin)
Cellulitis	Erythematous warm, rapidly-spreading plaque with ill-defined borders	Primarily GABHS Treatment: penicillin or erythromycin in allergic patients
Erysipeloid	Bright red or purple well-demarcated plaques with a shiny surface on the webs of the fingers or hands	Erysipelothrix rhusiopathiae Self-limited with spontaneous remission in 2-4 wks; penicillin to speed recovery
Necrotizing Fascitis	Erythematous skin of the legs or perineum that becomes dusky with bullae formation, quickly followed by necrosis and gangrene	Surgical emergency requiring surgical debridement, fasciotomy and possible amputation. Parenteral antibiotics mandatory, drug of choice depending on the infecting organism.

nal occlusion. Dilated capillaries and lymph vessels are also present (7).

Differential diagnosis

The differential diagnosis can be wide. It includes insect bites and stings, cellulitis, ecthyma gangrenosum, allergic contact dermatitis, urticaria, erysipeloid, herpes simplex, necrotizing fasciitis, and carcinoma erysipeloides (Table 1). Arthropod bites and stings may cause significant lymphedema, warmth, and erythema around the area of the bite/sting. However, the area is commonly pruritic and is less likely to be painful. The skin findings progress in a matter of hours rather than days (22). Cellulitis is similar to erysipelas; however, the erythema is less well-defined and lacks the sharply raised borders of erysipelas. Cellulitis is a deeper infection. It involves the skin and soft tissues, and often fascia, muscles, and tendons (13, 17, 19).

Angioinvasion is characteristic of ecthyma gangrenosum, a vesiculobullous eruption typically caused by *Pseudomonas aeruginosa* infection. *P. aeruginosa* invades cutaneous blood vessels and perivascular connective tissue, which leads to coagulative necrosis. Ecthyma gangrenosum usually begins as erythematous macules, which become pustular and ultimately develop into necrotic nodules and bullae (23). Allergic contact dermatitis results in erythematous patches with overlying vesicles and bullae, which may resemble advanced erysipelas (17, 18). They tend to be pruritic and nontender. Urticaria is characterized by erythematous or blanching wheals, which can be linear, annular (circular), arcuate (semicircular), or serpiginous (16). The predominant symptom is pruritus. The differential should also include a localized drug eruption. When differentiating erysipeloid, occupational history is of particular importance. Fishermen, fish handlers, butchers, and people that come in contact with raw seafood or uncooked meat are at risk for this bacterial infection. Wound culture would demonstrate *Erysipelothrix rhusiopathiae*, a gram-positive rod (24). Herpes zoster manifests as an erythematous, vesicular rash, usually along a single dermatome. In particular, involvement of the face may be confused with erysipelas and can be differentiated by culture, Tzanck smear, and Bell's palsy upon physical examination when present (25).

Necrotizing fasciitis is a rapidly spreading infection of the deep fascia and subcutaneous tissues that eventually leads to necrosis. It is also a possible complication of erysipelas. *S. pyogenes* is the classic pathogen responsible for necrotizing fasciitis, but most patients have a mixed infection with other aerobes (group B and C *streptococci*) and anaerobes (*Clostridium*) (7). The most common site for infection is the legs, followed by the perineum. The infection starts much like erysipelas, with an area of

erythematous skin that, within hours to days, becomes dusky with bullae formation. This change is quickly followed by necrosis and gangrene, often with crepitus if due to a gas-producing infective organism(s). The infection spreads rapidly, extending horizontally and vertically along the deep fascial plane. Common predisposing factors for necrotizing fasciitis include injury to soft tissues and diabetes mellitus. Without prompt treatment, patients can develop fever, systemic toxicity, organ failure, and shock, often resulting in death. Computed tomography or magnetic resonance imaging may help to delineate the extent of infection, and biopsy with tissue culture may help direct antibiotic therapy. Unlike erysipelas, necrotizing fasciitis is a surgical emergency requiring prompt surgical debridement, fasciotomy, and, occasionally, amputation of the affected extremity. Treatment with intravenous antibiotics is mandatory. Even with treatment, mortality can approach 70% (7, 21, 26).

Treatment

Antibiotics are the mainstay of treatment for erysipelas. GABHS, the most likely etiologic agent, remains susceptible to beta-lactam antibiotics. Therefore, oral penicillin for 10 to 14 days is the drug of choice in patients that are not allergic or intramuscularly benzathine penicillin 2.4 MU. For those with a penicillin allergy, erythromycin is often preferred. Antibiotic therapy can be further tailored to microbiological findings based on culture and sensitivities. Whatever the therapeutic regimen, immunocompetent patients are usually treated on an outpatient basis for the recommended minimum of 10 days with a follow-up visit within 48 to 72 hours of the initiation of treatment (11, 12). Hospitalization is generally recommended for very young or immunocompromised patients for a few days, after which patients can be followed on an outpatient basis with continued oral antibiotic therapy for 10 to 14 days.

We do not usually recommend use of either steroids or ibuprofen. However, one randomized, controlled, double-blind study compared the outcomes of antibiotics with placebo or antibiotics combined with prednisolone (titrated dosing schedule ranging from 5 to 30 mg/d over 8 days) in the treatment of 112 patients with erysipelas (27). It showed that patients receiving the anti-inflammatory steroid had a shorter resolution time and decreased length of hospital stay. These patients were shown to benefit from the administration of prednisolone without additional sequelae or significant side effects. Another prospective work suggested that the use of ibuprofen (400 mg every 6 hours for 5 days) in conjunction with antibiotic therapy can also hasten the recovery time for patients with erysipelas and other skin infections, without negative side effects (28).

Pain and fever control may also be indicated, especially in very young patients. Recommended oral analgesics and antipyretics include acetaminophen at 325 to 650 mg every 4 to 6 hours, ibuprofen 200 to 400 mg every 4 to 6 hours, acetaminophen with codeine at 30 to 60 mg every 4 to 6 hours, aspirin at 325 to 650 mg every 4 to 6 hours, and acetaminophen with oxycodone 1 to 2 tabs every 4 to 6 hours for severe pain.

Recurrent erysipelas

Recurrences of erysipelas are especially prevalent in patients suffering from local impairment of circulation and are more commonly associated with erysipelas of the leg. Hemolytic streptococci may persist in small scars. However, a re-infection is more likely to originate from oral or pharyngeal cavity, although an anal carrier state of GABHS is also possible. In these cases, antimicrobial prophylaxis may be administered for a longer time, by daily administration of penicillin V orally or intramuscularly (i.e., benzathine penicillin 2.4 MU every 3 weeks for 1 or 2 years). Continuous antibiotic prophylaxis is indicated only in patients with a high recurrence rate (30).

Conclusion

Erysipelas is a relatively common and usually easily treatable condition if handled early. Possible complications include septicemia, meningitis, endocarditis, necrotizing fasciitis, and streptococcal toxic shock syndrome (31). The mainstay for treatment of erysipelas caused by GABHS is penicillin. In some patients other appropriate antibiotic coverage may be necessary. The prognosis is excellent for patients receiving suitable and timely treatment. Most patients experience a complete recovery after antibiotics and few experience recurrences. In high-risk patients, recurrences occur in up to 20%.

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