Cellulitis

Cellulitis is a bacterial infection involving the inner layers of the skin.[1] It specifically affects the dermis and subcutaneous fat.[1] Signs and symptoms include an area of redness which increases in size over a few days.[1] The borders of the area of redness are generally not sharp and the skin may be swollen.[1] While the redness often turns white when pressure is applied, this is not always the case.[1] The area of infection is usually painful.[1] Lymphatic vessels may occasionally be involved,[1][3] and the person may have a fever and feel tired.[2]

The legs and face are the most common sites involved, though cellulitis can occur on any part of the body.[1] The leg is typically affected following a break in the skin.[1] Other risk factors include obesity, leg swelling, and old age.[1] For facial infections, a break in the skin beforehand is not usually the case.[1] The bacteria most commonly involved are streptococci and *Staphylococcus aureus*.[1] In contrast to cellulitis, erysipelas is a bacterial infection involving the more superficial layers of the skin, present with an area of redness with well-defined edges, and more often is associated with a fever.[1] Diagnosis is usually based on the presenting signs and symptoms, while cell culture is rarely possible.[1] Before making a diagnosis, more serious infections such as an underlying bone infection or necrotizing fasciitis should be ruled out.[3]

Treatment is typically with antibiotics taken by mouth, such as cephalexin, amoxicillin or cloxacillin.[1][5] Those who are seriously allergic to penicillin may be prescribed erythromycin or clindamycin instead.[5] When methicillin-resistant *S. aureus* (MRSA) is a concern, doxycycline or trimethoprim/sulfamethoxazole may, in addition, be recommended.[1] Concern is related to the presence of pus or previous MRSA infections.[1][2] Elevating the infected area may be useful, as may pain killers.[3][5]

Cellulitis

Skin cellulitis

Specialty	Infectious disease
Symptoms	Red, hot, painful area of skin, fever[1][2]
Duration	7–10 days[2]
Causes	Bacteria[1]
Risk factors	Break in the skin, obesity, leg swelling, old age[1]
Diagnostic method	Based on symptoms[1]
Differential diagnosis	Deep vein thrombosis, stasis dermatitis, erysipelas, Lyme disease, necrotizing fasciitis[1][3][4]
Treatment	Elevation of the affected area[3]
Medication	Antibiotics such as cephalexin[1][5]
Frequency	21.2 million (2015)[6]
Deaths	16,900 (2015)[7]

Potential complications include abscess formation.[1] Around 95% of people are better after seven to ten days of treatment.[2] Those with diabetes, however, often have worse outcomes.[8] Cellulitis occurred in about 21.2 million people in 2015.[6] In the United States about two of every 1,000 people per year have a case affecting the lower leg.[1] Cellulitis in 2015 resulted in about 16,900 deaths worldwide.[7] In the United Kingdom, cellulitis was the reason for 1.6% of admissions to a hospital.[5]

Contents

Signs and symptoms

The typical signs and symptoms of cellulitis is an area which is red, hot, and painful. The photos shown here are of mild to moderate cases, and are not representative of earlier stages of the condition.

Cellulitis following an abrasion: Note the red streaking up the arm from involvement of the lymphatic system.

Infected left shin in comparison to shin with no sign of symptoms

Cellulitis of the leg with foot involvement

Complications

Potential complications may include abscess formation, fasciitis, and sepsis.[1][9]

Causes

Cellulitis is caused by a type of bacteria entering the skin, usually by way of a cut, abrasion, or break in the skin. This break does not need to be visible. Group A *Streptococcus* and *Staphylococcus* are the most common of these bacteria, which are part of the normal flora of the skin, but normally cause no actual infection while on the skin's outer surface.

About 80% of cases of Ludwig's angina, or cellulitis of the submandibular space, are caused by dental infections. Mixed infections, due to both aerobes and anaerobes, are commonly associated with this type of cellulitis. Typically, this includes alpha-hemolytic streptococci, staphylococci, and bacteroides groups.[10]

Predisposing conditions for cellulitis include insect or spider bite, blistering, animal bite, tattoos, pruritic (itchy) skin rash, recent surgery, athlete's foot, dry skin, eczema, injecting drugs (especially subcutaneous or intramuscular injection or where an attempted intravenous injection "misses" or blows the vein), pregnancy, diabetes, and obesity, which can affect circulation, as well as burns and boils, though debate exists as to whether minor foot lesions contribute. Occurrences of cellulitis may also be associated with the rare condition hidradenitis suppurativa or dissecting cellulitis.

The appearance of the skin assists a doctor in determining a diagnosis. A doctor may also suggest blood tests, a wound culture, or other tests to help rule out a blood clot deep in the veins of the legs. Cellulitis in the lower leg is characterized by signs and symptoms similar to those of a deep vein thrombosis, such as warmth, pain, and swelling (inflammation).

This reddened skin or rash may signal a deeper, more serious infection of the inner layers of skin. Once below the skin, the bacteria can spread rapidly, entering the lymph nodes and the bloodstream and spreading throughout the body. This can result in influenza-like symptoms with a high temperature and sweating or feeling very cold with shaking, as the sufferer cannot get warm.

In rare cases, the infection can spread to the deep layer of tissue called the fascial lining. Necrotizing fasciitis, also called by the media "flesh-eating bacteria", is an example of a deep-layer infection. It is a medical emergency.

Risk factors

The elderly and those with a weakened immune system are especially vulnerable to contracting cellulitis. Diabetics are more susceptible to cellulitis than the general population because of impairment of the immune system; they are especially prone to cellulitis in the feet, because the disease causes impairment of blood circulation in the legs, leading to diabetic foot or foot ulcers. Poor control of blood glucose levels allows bacteria to grow more rapidly in the affected tissue, and facilitates rapid progression if the infection enters the bloodstream. Neural degeneration in diabetes means these ulcers may not be painful, thus often become infected. Those who have suffered poliomyelitis are also prone because of circulatory problems, especially in the legs.

Immunosuppressive drugs, and other illnesses or infections that weaken the immune system, are also factors that make infection more likely. Chickenpox and shingles often result in blisters that break open, providing a gap in the skin through which bacteria can enter. Lymphedema, which causes swelling on the arms and/or legs, can also put an individual at risk.

Diseases that affect blood circulation in the legs and feet, such as chronic venous insufficiency and varicose veins, are also risk factors for cellulitis.

Cellulitis is also common among dense populations sharing hygiene facilities and common living quarters, such as military installations, college dormitories, nursing homes, oil platforms, and homeless shelters.

Diagnosis

Cellulitis is most often a clinical diagnosis, readily identified in many people by history and physical examination alone, with rapidly spreading areas of cutaneous swelling, redness, and heat, occasionally associated with inflammation of regional lymph nodes. While classically distinguished as a separate entity from erysipelas by spreading more deeply to involve the subcutaneous tissues, many clinicians may classify erysipelas as cellulitis. Both are often treated similarly, but cellulitis associated with furuncles, carbuncles, or abscesses is usually caused by *S. aureus*, which may affect treatment decisions, especially antibiotic selection.[11] Skin aspiration of nonpurulent cellulitis, usually caused by streptococcal organisms, is rarely helpful for diagnosis, and blood cultures are positive in fewer than 5% of all cases.[11]

It is important to evaluate for co-existent abscess, as this finding usually requires surgical drainage as opposed to antibiotic therapy alone. Physicians' clinical assessment for abscess may be limited, especially in cases with extensive overlying induration, but use of bedside ultrasonography performed by an experienced practitioner readily discriminates between abscess and cellulitis and may change management in up to 56% of cases.[12] Use of ultrasound for abscess identification may also be indicated in cases of antibiotic failure. Cellulitis has a characteristic "cobblestoned" appearance indicative of subcutaneous edema without a defined hypoechoic, heterogeneous fluid collection that would indicate abscess.[13]

Differential diagnosis

Other conditions that may mimic cellulitis include deep vein thrombosis, which can be diagnosed with a compression leg ultrasound, and stasis dermatitis, which is inflammation of the skin from poor blood flow. Signs of a more severe infection such as necrotizing fasciitis or gas gangrene that would require prompt surgical intervention include purple bullae, skin sloughing, subcutaneous edema, and systemic toxicity.[11] Misdiagnosis can occur in up to 30% of people with suspected lower-extremity cellulitis, leading to 50,000 to 130,000 unnecessary hospitalization and $195 to $515 million in avoidable healthcare spending annually in the United States.[14]

Associated musculoskeletal findings are sometimes reported. When it occurs with acne conglobata, hidradenitis suppurativa, and pilonidal cysts, the syndrome is referred to as the follicular occlusion triad or tetrad.[15]

Lyme disease can be misdiagnosed as cellulitis. The characteristic bullseye rash does not always appear in Lyme disease (the rash may not have a central or ring-like clearing, or not appear at all).[16] Factors supportive of Lyme include recent outdoor activities where Lyme is common and rash at an unusual site for cellulitis, such as armpit, groin, or behind the knee.[17][16] Lyme can also result in long-term neurologic complications.[18] The standard treatment for cellulitis, cephalexin, is not useful in Lyme disease.[4] When it is unclear which one is present, the IDSA recommends treatment with cefuroxime axetil or amoxicillin/clavulanic acid, as these are effective against both infections.[4]

Prevention

In those who have previously had cellulitis, the use of antibiotics may help prevent future episodes.[19] This is recommended by CREST for those who have had more than two episodes.[5] A 2017 meta-analysis found a benefit of preventative antibiotics for recurrent cellulitis in the lower limbs, but the preventative effects appear to diminish after stopping antibiotic therapy.[20]

Treatment

Antibiotics are usually prescribed, with the agent selected based on suspected organism and presence or absence of purulence,[11] although the best treatment choice is unclear.[21] If an abscess is also present, surgical drainage is usually indicated, with antibiotics often prescribed for co-existent cellulitis, especially if extensive.[12] Pain relief is also often prescribed, but excessive pain should always be investigated, as it is a symptom of necrotizing fasciitis. Elevation of the affected area is often recommended.

Steroids may speed recovery in those on antibiotics.[1]

Antibiotics

Antibiotics choices depend on regional availability, but a penicillinase-resistant semisynthetic penicillin or a first-generation cephalosporin is currently recommended for cellulitis without abscess.[11] A course of antibiotics is not effective in between 6 and 37% of cases.[22]

Epidemiology

Cellulitis in 2015 resulted in about 16,900 deaths worldwide, up from 12,600 in 2005.[7]

Other animals

Horses may acquire cellulitis, usually secondarily to a wound (which can be extremely small and superficial) or to a deep-tissue infection, such as an abscess or infected bone, tendon sheath or joint.[23][24] Cellulitis from a superficial wound usually creates less lameness (grade 1–2 of 5) than that caused by septic arthritis (grade 4–5). The horse exhibits inflammatory edema, which is hot, painful swelling. This swelling differs from stocking up in that the horse does not display symmetrical swelling in two or four legs, but in only one leg. This swelling begins near the source of infection, but eventually continues down the leg. In some cases, the swelling also travels distally. Treatment includes cleaning the wound and caring for it properly, the administration of NSAIDs, such as phenylbutazone, cold hosing, applying a sweat wrap or a poultice, and mild exercise. Veterinarians may also prescribe antibiotics. Cellulitis is also seen in staphylococcal and corynebacterial mixed infections in bulls.[25]

See also

- *Haemophilus influenzae* cellulitis
- *Helicobacter* cellulitis
- Tuberculous cellulitis

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External links

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