

Frequent bacterial skin and soft tissue infections: diagnostic signs and treatment

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Skin and soft tissue infections rank among the most frequent infections worldwide. They are a frequent reason for hospitalization and application of antibiotics.

The nomenclature for different soft tissue infections is heterogeneous. However, we think accurate definitions and diagnosis of the respective infection is crucial, for only this allows for adequate treatment with the most effective antibiotic.

Impetigo and ecthyma are superficial bacterial infections of the epidermis, caused by beta-hemolytic streptococci or *S. aureus*, which may lead to subcorneal acantholysis or even blistering, and to crusted erosions. It is not to be equated with secondary impetiginization of preexisting skin diseases, for example, in the context of various forms of eczema. In children, the delicate skin is more prone to microlesions that facilitate the penetration of the aforementioned bacteria; children therefore contract impetigo more frequently. Low socioeconomic status and a warm and humid climate are precipitating factors. Endemic outbreaks occur among children in kindergartens or schools, especially in late summer. Impetigo caused by *Streptococcus pyogenes*, especially serotypes 1, 4, 12, and 25, bears the risk of acute poststreptococcal glomerulonephritis.

Clinically, impetigo begins as a small, thin-walled blister on an erythematous base. The blisters quickly rupture and spread peripherally. The blister roof and the leaking serum give rise to the characteristic honey-colored brown-yellow scabs that cover the polycyclic erosive lesions. Impetigo most frequently appears in the face or on the extremities. The lesions may be solitary or multiple, and have

a slow tendency to heal. The diagnosis is made clinically. However, due to the high prevalence of macrolide-resistant *Streptococcus pyogenes* or *S. aureus* strains, or whenever methicillin-resistant *S. aureus* (MRSA) is suspected, isolation and susceptibility testing of the pathogens is recommendable. Molecular genetic detection (PCR) of Panton-Valentine leukocidin (PVL) should be performed if there is corresponding evidence for an infection with community-associated MRSA (cMRSA) such as recurrent furuncles in otherwise healthy children and adults, rapidly developing necroses, or progressive cutaneous abscesses, especially in returnees from endemic areas (USA, Pacific Asia).

Classic *erysipelas* is defined as a non-purulent infection by beta-hemolytic streptococci. The typical signs are tender, warm, bright erythema with tongue-like extensions and early systemic symptoms such as fever or at least chills. Streptococci are always susceptible to penicillin.

Limited soft tissue infection or *limited cellulitis* are the provisional terms we have introduced for infections frequently caused by *S. aureus* and often originating from chronic wounds or acute trauma. Clinically, they are marked by tender, erythematous swelling which, unlike *erysipelas*, exhibit a darker red hue and is not always accompanied by fever or chills at onset.

Severe cellulitis or *severe soft tissue infection* is an often purulent, partially necrotic infection extending to the fascia, with general symptoms of infection (fever, leukocytosis or raised CRP or ESR), requiring surgical management in addition to antibiotics. It often fulfils criteria of so-called *complicated soft tissue infections* according to the former definition of the FDA, due to their frequent association with e.g. severe diabetes mellitus, peripheral arterial occlusive disease or severe immunosuppression.

In contrast, the rare *necrotizing skin and soft tissue infections* represent a distinct entity, characterized by rapid progression to ischemic necrosis and shock due to special bacterial toxins.



THERAPY

In case of only few impetigo lesions, topical therapy with retapamulin (though it is an antibiotic it is not intended for systemic use) or an antiseptic in a good galenic formulation are the therapies of first choice. Although topical application of mupirocin and fusidic acid has proven to be equally or even more effective than systemic antibiotic therapy in the treatment of impetigo, broad topical application of these antibiotics verifiably increases the risk of resistance development. Indications for the additional use of antibiotics would be multiple lesions (e.g. cefadroxil (1 g once daily), flucloxacillin (1 g 3 times daily) or roxithromycin (0.3 g once daily) or evidence of hemolytic streptococci (phenoxymethylpenicillin (penicillin V) (1.2–1.5 mil. IU 3 times daily).

Erysipelas always and best responds to penicillin (oral dosage in uncomplicated forms, 3 x 10 Mill i.v. in complicated forms).

Limited cellulitis should be treated with cephalosporines group 1 or 2 (e.g. cefadroxil (1 g once daily), or, when *S.aureus* is the isolated or highly likely causative agent, isoxazolyl-penicillins (flucloxacillin, 1 g 3 times daily), exploiting their minimal selection pressure on other bacteria.

For severe cellulitis, initial antibiotic treatment (mostly iv) includes – depending on the location - agents also active against gram-negative and/or anaerobic bacteria (e.g. clindamycine, aminopenicilline with inhibitors of betalaktamase, in cases with marked systemic symptoms piperacilline and sulbactam).

For cutaneous abscesses, drainage presents the therapy of choice. Only under certain conditions additional antibiotic therapy is required.

Adherence to the diagnostic criteria and to evidence-based or consensus-derived treatment recommendations should allow for an antibiotic therapy with a good balance of efficacy, tolerability by patients and low selection pressure for highly resistant bacteria. Well-aimed antibiotic therapy is a major responsibility for each doctor because of the emergence of highly resistant strains.

REFERENCE

Sunderkötter C, Becker K. Frequent bacterial skin and soft tissue infections: diagnostic signs and treatment. *J Dtsch Dermatol Ges.* 2015;13:501-24.