

Mini-review

The role of anaerobic bacteria in cutaneous and soft tissue abscesses and infected cysts

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Abstract

This review presents the aerobic and anaerobic microbiological aspects and management of cutaneous and soft tissue abscesses, paronychia, anorectal, pilonidal, and perirectal abscesses, infected epidermal cysts, hidradenitis suppurativa, and pustular acne lesions. These infections often occur in different body sites or in areas that have been compromised or injured by foreign body, trauma, ischemia, malignancy or surgery. In addition to group A beta-hemolytic streptococci and *Staphylococcus aureus*, the indigenous aerobic and anaerobic cutaneous and mucous membranes local microflora usually is responsible for these generally polymicrobial infections. These infections may occasionally lead to serious potentially life-threatening local and systemic complications. The infections can progress rapidly and early recognition and proper medical and surgical management is the cornerstone of therapy.

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Cutaneous and soft tissue abscesses and infected cysts infections are among the most common infections, and may sometimes lead to serious local and systemic complications. These infections can be potentially life-threatening infections that may have rapid progress. Their early recognition and proper medical and surgical management is therefore of primary importance.

In addition to group A beta-hemolytic streptococci (GABHS) and *Staphylococcus aureus*, the indigenous aerobic and anaerobic cutaneous and mucous membranes local microflora usually is often responsible for polymicrobial infections. Anaerobic infections of the skin and soft tissue frequently occur in areas of the body that have been compromised or injured by foreign body, trauma, ischemia, malignancy or surgery. Because the indigenous local microflora usually is responsible for these infections, anatomic sites that are subject to fecal or oral contamination are particularly at risk (Fig. 1).

This review summarizes the aerobic and anaerobic microbiological aspects and management of cutaneous and soft tissue abscesses, paronychia, anorectal abscess,

pilonidal abscess, perirectal abscess, infected epidermal cysts, hidradenitis suppurativa, and pustular acne lesions.

1. Cutaneous abscesses

Subcutaneous and cutaneous abscesses can be caused by polymicrobial aerobic and anaerobic bacteria. Although the primary management of these infections is usually through surgical drainage, knowledge of their microbiology allows institution of empiric antimicrobial therapy prior to the availability of culture results.

1.1. Microbiology

The commonest organisms involved in skin and soft tissue infections are *S. aureus* and GABHS [1]. They frequently cause impetigo, furunculosis, cellulitis, and wound infections [2]. Recently, many of the *S. aureus* isolates are methicillin resistant. Gram-negative enteric bacteria (i.e. *Enterobacter* spp., and *Escherichia coli*) are also recovered occasionally.

The predominant anaerobes are Gram-positive cocci, Gram-negative bacilli (including *Bacteroides fragilis* group

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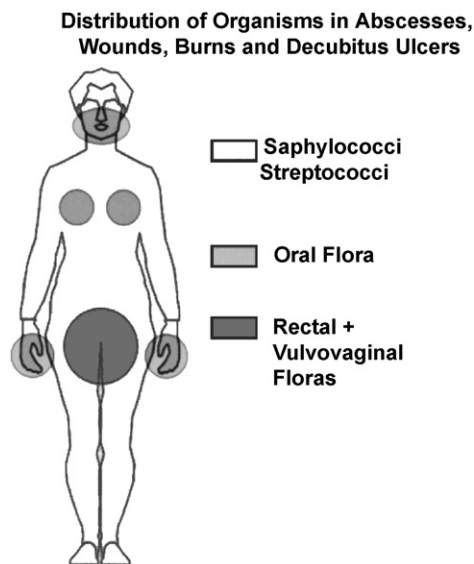


Fig. 1. Distribution of organisms in abscesses, wound, burns and decubitus ulcers.

and, *Prevotella* and *Porphyromonas* spp.), and *Fusobacterium* spp. [1–3]. Anaerobes predominate in infections of the vulvovaginal, buttocks, perirectal, finger, and head areas. Aerobic bacteria are prevalent in the neck, hand, leg, and trunk areas. Many of these infections are polymicrobial.

S. aureus, the most prevalent aerobe, is found whenever abscesses originate from skin surface. It is, recovered however, less often from the buttocks, perirectal, and vulvovaginal areas. The infections at these latter sites generally originate from adjacent mucous membranes rather than skin. Among Gram-negative aerobes, *Enterobacter* spp. are recovered mostly from the trunk and legs, while *E. coli* is recovered mainly from the vulvovaginal, buttocks, and perirectal areas.

Peptostreptococcus spp. which are normal skin inhabitants and part of the endogenous gastrointestinal flora [4], are also recovered from infections at all sites. *B. fragilis* group, which predominate in the feces, are cultured most frequently from abscesses of the perirectal area. Pigmented *Prevotella* and *Porphyromonas* spp., which occurs in stools as well as in the oral cavity [2,4], are isolated from infections proximal to these sites and from the head and neck. Most strains of *B. fragilis* group and many of *Prevotella* *Porphyromonas* and *Fusobacterium* spp. are resistant to penicillins. Beta-lactamase-producing bacteria (BLPB) are recovered in about half of the abscesses.

1.2. Pathogenesis

Factors predisposing to abscess formation include obstruction of drainage, ischemia, chemical irritation, hematoma formation, accumulation of fluid, foreign bodies, trauma, and stasis in the vascular system.

The site of the abscess is of paramount importance in the selection of the organism(s) that may be cause the

infection. Under appropriate conditions of lowered tissue resistance, almost any of the common bacteria can initiate an infectious process. Cultures obtained from abscesses frequently contain several bacterial species, and as might be expected, the organisms found most frequently are the “normal flora” of these regions (Fig. 1).

Aspirates obtained from abscesses of the perineal and rectal area tend to yield organisms found in stool, and those obtained from oral regions generally harbor mouth flora. Conversely, pus recovered from abscesses in areas remote from the rectum or mouth contains primarily constituents of the microflora indigenous to the skin [2–4].

1.3. Diagnosis

Redness, tenderness, heat, and swelling are characteristic of skin and subcutaneous tissues infections. Associating lymphangitis is characterized by the presence of reddish streaks extending proximally and associated with tender enlargement of regional lymph nodes. Systemic symptoms can be mild, and include fever, and malaise. Fluctuation in the abscess indicates that it is ready for drainage. Laboratory findings include leukocytosis, rapid sedimentation rate, and often positive blood cultures. Some organisms can cause bacteremia more frequently, and manipulation including surgical incision of the abscess may be followed by transient bacteremia.

Pus or material recovered by aspiration or incision should be Gram stained and cultured for both aerobic and anaerobic bacteria as well as fungi.

Radiological studies may reveal localized collections of pus when free gas is present or when abnormal tissue density is observed. Ultrasound, computed tomography (CT), angiography, and radionuclide scans may be helpful [5].

1.4. Management

Surgical drainage is the treatment of choice. Although antimicrobials may prevent suppuration if given early or prevent spread of an existing abscess, they are not an adequate substitute for surgical evacuation. Heat application can relieve the pain and facilitate suppuration and liquefaction.

Some antimicrobials can be partially inactivated by pus and by low pH (aminoglycosides and quinolones). The activity of some antibiotics that are effective against multiplying organisms (i.e. beta-lactams) is impaired by the failure of bacteria to multiply in pus. Furthermore, phagocytosis is reduced in the abscess cavity. Because of the combination of these factors, many abscesses are resistant to antimicrobial therapy.

Because anaerobic bacteria frequently are associated with cutaneous abscesses, especially in areas adjacent to mucosal membranes, their presence should be anticipated if antimicrobial therapy is given. Appropriate antimicrobials include clindamycin, metronidazole, cefoxitin, a

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