BRIEF REPORT

Diagnosis of cellulitis in the immunocompromised host

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ABSTRACT: A prospective study of diagnostic techniques in cellulitis was performed on 28 patients with malignancy. Twenty-two (78%) of the fine needle aspiration cultures and 10 (35%) of the blood cultures were positive in this immunocompromised population. The incidence of positive fine needle aspiration cultures (P<0.005) or bacteremia (P<0.0005) was significantly higher than results obtained in an immunocompetent population with cellulitis at the same institution. Staphylococci or streptococci were recovered in 59% of positive cultures, while aerobic Gram-negative bacilli grew in 33%. This study indicates that in the immunocompromised population with cellulitis, fine needle aspiration and blood cultures should be obtained, and the antibiotic regimen should cover Gram-positive cocci and Gram-negative bacilli pending the results of cultures. Can J Infect Dis 1990;1(4):133-135

Key Words: Bacteremia, Cellulitis, Fine needle aspiration, Malignancy, Neutropenia

Skin and soft tissue infections account for 22 to 33% of infections in immunocompromised patients (1). Cellulitis is a diffuse infection of the skin and underlying subcutaneous tissue that presents clinically with local erythema, warmth, edema, tenderness and occasional systemic symptoms (malaise, fever and chills). Staphylococcus aureus and group A streptococci are the usual pathogens involved in cellulitis (2,3). However, in the immunocompromised host there is an increased risk of infection with aerobic Gram-negative bacilli and fungi (2). Kielhofner et al (4) reported an increased sensitivity of fine needle aspiration in the diagnosis of the etiologic agent causing cellulitis in the immunocompromised host, especially the diabetic. To further delineate the role of fine needle aspiration in the immunocompromised host, the authors performed a prospective study of patients with malignancies admitted to hospital with acute cellulitis.

PATIENTS AND METHODS

Patients with a previous diagnosis of malignancy admitted to Truman Medical Center over a period of 28 months with a diagnosis of acute cellulitis were included in the study after informed consent was obtained. Cellulitis was diagnosed by the clinical findings described above. Patients were excluded from the study if the cellulitis was associated with ulcerative lesions, abscesses, underlying osteomyelitis, or concurrent antibiotic therapy.

Fine needle aspiration of the leading edge of the cellulitis was performed according to the procedure described by Uman and Kunin in 1974 (5). The skin was disinfected with povidone-iodine and alcohol, and a sterile 21 or 22 gauge needle inserted without local anesthetic at the leading edge...
A saline solution was injected into the study. There were 13 male and 15 female patients and one each (3.5%) of breast (lung cancer) and anaerobic blood cultures were obtained.

Table 1 shows the sites of infection: extremity 18 (64%); lower extremity eight (28%); age of 46. The sites of infection included: upper cutaneous tissue and aspirate. The recovered MacConkey agar, chocolate agar, and a liquid thio glycolate medium. In addition, anaerobic and aerobic blood cultures were reported. No fungi were recovered.

Experimental data were analyzed by Student’s t test.

**RESULTS**

Twenty-eight patients were enrolled in the study. There were 13 male and 15 female patients between the ages of 18 and 82 years with a mean age of 46. The sites of infection included: upper extremity 18 (64%); lower extremity eight (28%); and one each (3.5%) of breast (lung cancer) and perineum (ovarian cancer). Eight of the 28 patients had neutrophil counts less than 1000/mm^3.

Twenty-two (78%) of the fine needle aspiration cultures were positive. Blood cultures were positive in 10 patients (35%), including six of eight neutropenic patients (Table 1). The organisms isolated in the blood cultures were identical to the bacteria recovered from fine needle aspiration cultures in all cases (kappa=1). Staphylococcus aureus or group A streptococci were recovered in 13 cultures (59%) (Table 2). No fungi were recovered.

**DISCUSSION**

This study focused on cellulitis in the immunocompromised host. The high rate of positive cultures in patients with impaired immunity is probably secondary to increased numbers of infectious pathogens at the site of infection. Immunosuppression in patients with malignancies is secondary to effects of the neoplasm itself and the treatment modalities used in oncology. These defects consist of a decreased number of granulocytes, qualitative abnormalities in neutrophils, abnormal immunoglobulins, impaired cell-mediated immunity, and an impaired skin barrier (1,6,7).

The results also showed a high rate of bacteremia with the causative organism of the cellulitis. Others have reported positive blood culture rates in cellulitis of from 0 to 16% (8,9). Interestingly, bacteremia in the present study was remarkably high (38.5%) even compared to patients with cellulitis with granulocyte counts less than 100/mm^3 secondary to malignancy (19%) (10).

The value of fine needle aspiration is still debated, with sensitivities ranging from 5 to 64% in patients with a wide spectrum of underlying diseases (Table 3) (8,11). Epperly (12), who performed the only study exclusively on patients without underlying disease, reported nine of 103 patients (8.7%) with cellulitis having positive aspiration cultures, which all grew staphylococcal or streptococcal species. Kielhofner’s study (4) pointed out the value of fine needle aspiration in immunocompromised hosts, especially diabetics. In a comparison of patients with cellulitis with no underlying disease at the authors’ institution using the same methods, there was a significant increase in positive fine needle aspiration cultures (P<0.005) and bacteremia (P<0.0005) in patients...
with malignancies, and an increase incidence of aerobic Gram-negative infection (P<0.05).

The present results reaffirm fine needle aspiration as a sensitive and safe method for determining the etiology of cellulitis in this select patient population. Because of the higher incidence of aerobic Gram-negative bacilli and a significant tendency toward bacteremia, the authors recommend initial antibiotic coverage for both Gram-negative bacilli and Gram-positive cocci pending the results of cultures.

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REFERENCES