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Diagnostic Value of Bronchoalveolar Lavage in Leukemic and Bone Marrow Transplant Patients: The Impact of Antimicrobial Therapy.

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ABSTRACT

Pneumonia causes considerable morbidity and mortality in leukemic and bone recipients of bone marrow transplants. We investigated the bronchoalveolar lavage's (BAL) diagnostic yield in these newly infiltrated patients. Approximately 200 patients who had bronchoscopy at a single university cancer hospital and were not HIV leukemic or receiving hematopoietic stem cell transplantation (HSCT) had their retrospective charts reviewed. In this sample, a higher yield was linked to antimicrobial usage for less than 24 hours at the time of BAL (56.8% versus 32.8%, p<0.001). This supports the use of BAL for bronchoscopy in leukemic and HSC patients within 24 hours of starting antibiotic medication.

INTRODUCTION

In patients receiving bone marrow transplants and leukemias, pneumonia carries a high risk of morbidity and mortality.
1, 2 Concern is raised for both viral and non-infectious etiologies when pulmonary infiltrates arise in the context of such immunocompromise, some of which may be treated. When the infiltrates occur, many of these patients are given broad-spectrum antibiotics as a preventive measure or as a form of treatment. In clinical practice, bronchoscopy is frequently used to diagnose immune-compromised patients with lung infiltrates. This procedure has been well-documented.3,4 Several options are available for sampling the lower respiratory tract during a bronchoscopy. Among these, bronchoalveolar lavage (BAL) has been demonstrated to be less risky than transbonchial biopsy and is particularly effective in obtaining samples from the alveoli.4,5 In fact, BAL is a standard clinical procedure and has been shown to be an effective diagnostic technique for determining non-infectious etiologies as well as causal infections in immunocompromised populations3. When immunocompromised patients, such as those with HIV or solid organ transplants, have lung infiltrates, the reported diagnostic yield of BAL varies greatly, from 22 to 80%.5–9 BAL sensitivity studies in patients undergoing hematopoietic stem cell transplantation (HSCT) show yields between 22 to 65%.6, 7, 9, and 12 Regarding the BAL yield in non-resolving pneumonia, a study conducted in a general intensive care unit (ICU) settings.

SUBJECTS AND METHODS

This study of the historical charts was conducted at one academic cancer center. A power analysis was carried out to ascertain the suitable number of samples. Based on our population-specific literature, which includes 6, 7, 9, 11, 12, 14, and 16, we estimated that a sample size of 300 people would be needed with a power of 0.8 to detect a 23% increase in BAL production if the BAL was acquired within 24 hours of the use of antibiotics. After an inpatient bronchoscopy, patients were chosen in reverse chronological order until 300 individuals were found to have either a hematopoietic stem cell transplant or a hematologic malignancy.

Ages under eighteen, an acquired immune deficiency syndrome (AIDS) or HIV diagnosis, and outpatient status were the exclusion criteria. One researcher, CY, examined and extracted data from electronic medical records. Information was gathered on leukocyte count, neutropenia, age, sex, cancer diagnosis, time since HSCT, and medicines. White blood cell (WBC) counts between 4,000 to 12,000/mm3 were regarded as normal. An absolute neutrophil count (ANC) of less than 500/mm3 was considered neutropenia. Medication records included the usage of immunosuppressants, glucocorticoids, antifungals, and antibiotics, as well as their dosage and timing. Converting glucocorticoids to prednisone equivalents, records were made if the patient had taken at least 20 mg per day for more than two months or 60 mg per day for more than three weeks. The presence of at least one pathogenic organism in the culture of this patient population was considered a positive BAL yield. Coagulase-negative staphylococci and Candida

species were regarded as colonizers. JG, our infectious disease specialist, explained any inconsistencies. Every patient underwent an identical bronchoscopy technique and procedure, using a Fujinon 470S bronchoscope for each procedure and following the same methodical approach.

DISCUSSION

In a sizable number of leukemic and HSCT patients with pulmonary infiltrates who were receiving antibiotics, this study assessed the diagnostic value of BAL. Our study's overall yield of a positive BAL test, 36.0%, fell within the broad range reported in other studies involving HSCT patients. The diagnostic yield of BAL within a 24-hour period was correlated with the length of antimicrobial therapy. At the time of their BAL, patients who had been taking antibiotics for less than 24 hours had a higher likelihood of having a pathogen found. Shannon's results, which showed higher BAL sensitivity in early BAL compared to late BAL in a comparable cohort, are consistent with this.10 It's interesting to note that among those receiving antibiotic medication for >48 hours at BAL, a modification in the regimen during the 48 hours before BAL was linked to a higher yield. This might be a result of a smaller sample size, a fresh infection, an ineffective antimicrobial switch, the severity of the disease, or a lower likelihood of colonization. This observation hasn't been specifically documented in this patient population, as far as we know. Based on the information that is currently available from this study, it is unknown whether or not this positive result signifies a real infection. In critically ill patients with pneumonia that was not improving, Pereira Gomes reported a 72% yield; at the time of BAL, more than 90% of these patients were receiving antibiotics.Thirteen Our results differ from those published by Souweine, who looked at ventilator-associated pneumonia in a general ICU population and discovered 83% of patients who were taking antibiotics for more than 72 hours at the time of BAL, 38% of patients who started taking new antibiotics within 24 hours of BAL, and 71% of patients who were not taking antibiotics four days before bronchoscopy had BAL sensitivity.17 It is significant to highlight that our study did not look at ventilatorassociated pneumonia (VAP) in a general ICU population, and that only a small percentage of our patients required mechanical ventilation. Patients who were neutropenic in our study had a lower chance of receiving a positive BAL result. This result was comparable to Shannon's findings, which showed a 50% yield in patients with an ANC <500 and a 32% yield in patients with an ANC <100.10 Patients on mechanical ventilation had greater BAL yields. This could be a contemplation.patients with bone marrow transplants and leukemia who have new pulmonary infiltrates that are not explained. For leukemic and HSCT patients with inexplicable new lung infiltrates, who are all on antimicrobials at the time of BAL, this study supports the standard procedure of obtaining a BAL specimen within 24 hours of antimicrobial medication.

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