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Microbiologic features and outcome of pneumonia in transplanted patients☆

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Abstract

We prospectively evaluated lower respiratory tract infections in solid organ transplantation (SOT) patients to determine the microbiologic diagnosis and clinical outcomes. We diagnosed 83 cases of pneumonia, 38 of which were community acquired and 45 were nosocomial. Those with bilateral infiltrates or absence of improvement after 3 days of treatment underwent fiberoptic bronchoscopy. Bacterial pneumonia was the most frequent diagnosis and mixed infection predominated in the nosocomial group (11/45 nosocomial versus 1/38 community). Fiberoptic bronchoscopy with bronchoalveolar lavage had higher diagnostic yield in nosocomial pneumonia (77% versus 47%). Mortality differences between the 2 groups were 58% nosocomial versus 8% community-acquired infections ($P < 0.001$). SOT patients with nosocomial pneumonia, or those who needed mechanical ventilation, had a high mortality rate and benefits from the fiberoptic diagnostic techniques.

Keywords: Pneumonia; Solid organ transplantation; Fiberoptic bronchoscopy; Hospital infections; Community infections

1. Introduction

Pulmonary infections are a major cause of morbidity and mortality in immunosuppressed patients. Crude mortality rates reach 10% in HIV patients with pulmonary infiltrates (Benito et al., 2001), 53% in recipients of hematopoietic stem cell transplantation, and 29% in hematologic malignancies (Rañó et al., 2002). Solid organ transplant recipients are characterized by a time-dependent variability in their state of immunosuppression, being higher in the first 3 months posttransplantation and decreasing in time (Fishman and Rubin, 1988). In this group of patients, the mortality rate of pneumonia is estimated to be about 30% (Torres et al., 2000; Chang et al., 2004), although it could be higher in the first month posttransplantation (Pirat et al., 2003). In the early postoperative period of liver transplant, patients requiring prolonged mechanical ventilation and who have a pneumonia have a mortality rate of 43% (Plevak et al., 1989; Shieh et al., 1992). A recent study on kidney transplant recipients showed a mortality rate of 11%, which

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decreased if pneumonia appeared 6 months posttransplantation (Chang et al., 2004).

The high variability of the mortality rates could be explained by the existence of 2 patterns of pulmonary infections in solid organ transplantation (SOT) patients: those with early infections, most of them from nosocomial origin and closer to the surgical procedure, and those with community-acquired pneumonia, usually in outpatients. The utility of fiberoptic techniques for the diagnostic of pulmonary infections in immunosuppressed patients has have been largely previously evaluated (Stover et al., 1984; Danés et al., 2002). However, for solid organ transplant patients, the benefits of invasive procedures for the diagnosis of lung infections have not been established. Microbiologic and clinical data are well defined in this group of patients, but there is also a lack of information regarding the risk factors for mortality. Thus, we aimed to investigate the diagnosis and outcomes of lower respiratory tract infections in solid organ transplant patients using a bronchoscopy-based diagnostic protocol.

2. Material and methods

2.1. Study subjects

We prospectively evaluated SOT patients with a new episode of pulmonary infiltrate who had clinical symptoms (fever, cough, dyspnea, or pleuritic chest pain), who required hospitalization, or who appeared during hospital stay. Hospital-acquired pneumonia was diagnosed according to the Center for Disease Control and Prevention criteria (Garner et al., 1988): new or increased production of purulent sputum and/or fever >38 °C, with chest signs appropriate with lung consolidation and/or new or progressive radiographic evidence of chest infiltrates not attributed to heart failure or other noninfectious processes. Among intubated patients, we included those with a new pulmonary infiltrate observed in chest radiographs with fever (temperature of >38 °C), white blood cells count of >12 × 10^9/L, or purulent tracheal secretions.

2.2. Study design

This prospective cohort study was performed from February 1998 to March 2002 in the Hospital Clínic Universitari, an 800-bed tertiary level hospital in Barcelona, Spain. The following variables were recorded for each of the patients upon study entry: age, sex, type and date of transplantation, immunosuppressive therapy, Acute Physiology and Chronic Health Evaluation (APACHE) II score, need for intensive care unit (ICU) admission or mechanical ventilation, and laboratory values. Patients were followed up until hospital discharge or death.

2.3. Diagnostic procedures

The diagnostic protocol used by our group has been previously described and analyzed (Danés et al., 2002). Within the first 48 h after the identification of a new onset of pulmonary infiltrate, sputum specimen (if possible) or bronchial aspirate (BAS) (if of mechanical ventilation) and samples of blood and urine for antigen testing and pleural fluid (in the case of associated pleural effusion) were obtained. In febrile or hemodynamically unstable patients, 2 sets of blood cultures were obtained. Sputum and BAS samples were Gram and Ziehl–Neelsen stained and cultured for aerobic bacteria, fungi, and mycobacteria. Induced sputum was, in addition, stained with Gomori's methena-

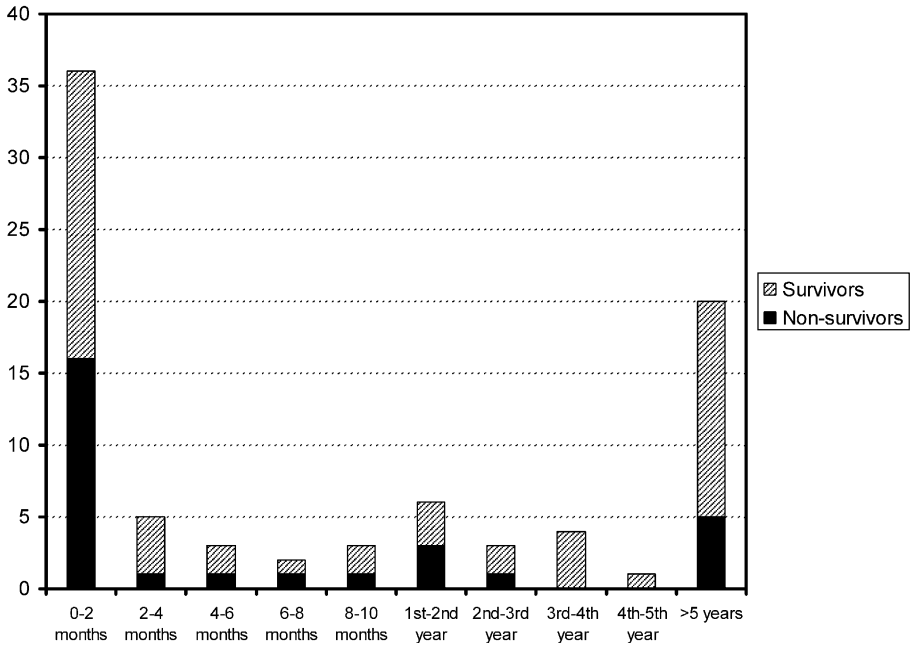

Fig. 1. Distribution of episodes through time. Survivors and nonsurvivors are represented in stacked bars.