Sepsis Syndrome and Death After Bronchoalveolar Lavage*

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Bronchoalveolar lavage is widely used in the management of patients with interstitial lung diseases and is considered a safe procedure. We describe a patient who died with a picture consistent with acute pulmonary edema and septic shock following bronchoalveolar lavage. This potential complication has not been previously reported.

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Fiberoptic bronchoscopy with bronchoalveolar lavage (BAL) is widely used in the management of patients with interstitial lung diseases. Morbidity and mortality associated with this procedure have been reported to be very low. We report the findings in a patient with an irreversible sepsis syndrome after BAL.

CASE REPORT

A 46-year-old man was admitted to the Rheumatology Department of our hospital with arthralgias, fever, and cutaneous lesions of 8 months’ duration. His medical history was unremarkable except for treated tuberculosis of the cervical lymph nodes. After further analysis, including serologic studies and skin biopsy, a provisional diagnosis of subacute cutaneous lupus erythematosus was made. The chest x-ray film on admission was normal. During the patient’s subsequent hospitalization, he developed a bilateral interstitial pulmonary infiltrate (Fig 1). Culture of sputum showed Haemophilus influenzae; however, we considered this to be an insufficient explanation. Therefore, the patient underwent a diagnostic BAL, using 2,000 ml of 0.9 percent sterile saline solution at body temperature. Two hours after the procedure, he had a chill and rapidly became dyspneic and hypotensive, with a blood pressure of 90/60 mm Hg. Samples of blood for cultures were drawn, but they remained sterile. Therapy with a second-generation cephalosporin and an aminoglycoside was started. The patient did not respond to fluid resuscitation and was transferred to the medical intensive care unit.

On physical examination, we saw a dyspneic and cyanotic man with a temperature of 39.4°C (102.9°F), heart rate of 130 beats per minute, respiratory rate of 30 to 35 breaths per minute, and blood pressure of 80/60 mm Hg. Cardiac examination showed a regular tachycardia with a systolic grade 2/6 murmur at the apex. Rales were present bilaterally. The liver was not palpable, and there was no peripheral edema. The rest of the physical examination showed no abnormalities.

Blood gas analysis showed severe hypoxemia, and a chest x-ray film revealed extensive alveolar consolidations compatible with acute pulmonary edema (Fig 2). Mechanical ventilation was initiated and a pulmonary artery catheter inserted. Initial results showed a cardiac index of 5.5 L/min, pulmonary artery pressure of 44/25 mm Hg, pulmonary artery occlusion pressure of 12 mm Hg, and a systemic vascular resistance index of 821 dynes·s·cm⁻⁵. Despite fluid resuscitation, administration of dobutamine and norepinephrine (noradrenaline), and mechanical ventilation with positive end-expiratory pressure, shock was irreversible. The patient developed multiple organ failure and died 48 h after the BAL. Request for autopsy was denied.

DISCUSSION

Fiberoptic bronchoscopy is widely used in the investigation of various pulmonary disorders. Major complications, such as serious arrhythmia, bleeding, pneumonia, or pneu-
mothax (0.01 to 0.3 percent), are rare.\textsuperscript{25,26} Reported deaths (0.08 percent) all had at least 1 of the 4 following serious underlying illnesses: cardiovascular disease, severe chronic pulmonary disease, pneumonia, or cancer. As long as no other techniques, such as transbronchial lung biopsy or extensive bronchial brushing are performed, BAL does not change the favorable side-effect profile of single fiberoptic bronchoscopy. Side effects consist of transient alveolar infiltration, crakcles in dependent lung lobes, fever, and transient deterioration of pulmonary function parameters.\textsuperscript{6-11} These alterations are nearly always reversible, and so far no lethal complication directly attributable to BAL has been reported.

Fever after BAL has been reported in 10 to 30 percent of patients, but is considered a minor complication. The incidence of fever after BAL is related to the total lavage fluid volume used.\textsuperscript{6,10} The mechanism responsible is still unclear. No bacteremia has been documented.\textsuperscript{15,16} Release of excessive amounts of tumor necrosis factor from mononuclear phagocytes\textsuperscript{4} and a sepsis-like mechanism, possibly endotoxin-related,\textsuperscript{19} have recently been suggested. In the latter study a sepsis-like syndrome was only seen in patients with documented pneumonia. Even if there was no pneumonia, 17 percent of the patients had fever after the procedure. The patient described had an unclassified systemic illness with slowly progressive, bilateral, interstitial lung abnormalities. After fiberoptic bronchoscopy with BAL, there was a fulminating deterioration. Two hours after the procedure, the patient had fever and chills, and within 5 h, there was profound hypotension and hypoxemia. The monitoring by pulmonary artery catheter was compatible with a septic hemodynamic pattern and noncardiogenic pulmonary edema. Cultures of blood and BAL fluid remained sterile. The delay for peak temperature (2 h) and lowest mean arterial pressure (5 h) was similar to previously reported cases.\textsuperscript{19} The time course in our patient strongly suggests a causal relation to the BAL. We hypothesize that the fulminating deterioration in our patient was caused by a massive release of inflammatory mediators, resulting in hypotension, pulmonary edema, and, finally, multiple organ failure. Although BAL is considered to be a safe technique, the present case illustrates the potential risk of the procedure.

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