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New strategy for severe Legionella pneumonia?

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SUMMARY

Legionella pneumonia is among the top three of microbial causes of community–acquired pneumonia. During the course of illness, respiratory failure, and even multiple organ failure may develop. Morbidity and mortality of patients with Legionella pneumonia has been attributed to an imbalanced immune response yielding organ failure and septic shock. In a case of severe Legionella pneumonia, the hemoperfusion with polymyxin B-immobilized fiber column (PMX) drastically improved the respiratory and hemodynamic states, suggesting that PMX might be a new strategy for severe Legionella pneumonia

Key words: Legionella pneumonia, Acute kidney injury, Polymyxin B-immobilized fiber column , PMX,

The importance of infections with Legionella, Mycoplasma pneumoniae, and Chlamydia pneumoniae has been indicated in community-acquired pneumonia. These three agents account for about a third of incidence of community–acquired pneumonia.[1]In the previous issue of 'Anaesthesia, Pain & Intensive Care', Matsuki, et al.[2] described a case of severe Legionella pneumonia complicated with acute kidney injury.

Legionella pneumonia has been historically referred to as 'atypical pneumonia' based on its atypical clinical presentation and chest radiographic findings, and the annual incidence of Legionella infection was reported to be 55/100,000.[1] This disease can be acquired by the inhalation of contaminated aerosols or by microaspiration of contaminated water.[3] Symptoms caused by Legionella include fever, malaise, myalgia, headache and cough. During the course of illness, fever exceeding 40°C, stupor, respiratory failure, and even multiple organ failure may develop.

The chest radiograph alone cannot be used to distinguish Legionella pneumonia from other pneumonias. In immunosuppressed patients, distinctive bilateral nodular opacities may be seen, which may expand and cavitate as seen in Matsuki's case.[2] Specialized laboratory tests are necessary to establish the diagnosis. The Legionella urinary antigen test is a relatively inexpensive, rapid test that detects antigens of Legionella pneumophila in urine.[3] This test has a sensitivity of 70% and a specificity of nearly 100%. Although sputum from the suspected patients should be cultured immediately, it is often easier to obtain a urine sample than adequate sputum specimen, since many patients have a nonproductive cough. In his case,[2] the diagnosis was made also on the basis of positive specific urinary antigen.

As for the treatment, erythromycin has historically been the drug of choice. Delay in instituting appropriate therapy for Legionella pneumonia significantly increases mortality. Especially, Legionella pneumonia complicated by acute kidney injury is associated with a mortality rate greater than 50%.[3] Risk factors associated with the development of severity include age, smoking, male gender, chronic obstructive pulmonary disease, alcohol intake, and immune suppression.[3]

An early and robust inflammatory response appears to occur in Legionella pneumonia. Various studies have identified the innate response that includes cytokines such as gamma interferon, tumor necrosis factor alpha, IL-12, and IL-18.[4] Morbidity and mortality of patients hospitalized with Legionella pneumonia has been attributed to an imbalanced immune response yielding organ failure and septic shock. The beneficial effects of corticosteroids added to antibiotic treatment have been reported in patients with vasopressor-dependent septic shock.[5] In Matsuki's case,[2] corticosteroid was not used, but direct hemoperfusion with polymyxin B-immobilized fiber column (PMX) was applied.

Polymyxin B is an antibiotic with high affinity for endotoxin, and thus, PMX was originally designed to reduce blood endotoxin levels in sepsis. Recently, PMX has been demonstrated to improve respiratory function in septic patients independently of the level of endotoxin. Seo et al[6] studied 6 patients with severe respiratory failure associated with idiopathic pulmonary fibrosis, and reported that AaDO2, KL-6, and lactate dehydrogenase were improved after hemoperfusion with PMX, in spite that blood endotoxin levels were undetectable even before the treatment. Kushi et al[7] studied 36 patients with sepsis, and reported that the blood levels of plasminogen activator inhibitor-1, neutrophil elastase, and IL-8 were significantly decreased and the PaO_2/FiO_2ratio was significantly improved after direct hemoperfusion with PMX.

In Matsuki's case,[2] the patient was in the state of severe respiratory failure and septic shock. Hemoperfusion with PMX was performed for 4 hours per day for 2 consecutive days. After introduction of PMX, blood pressure and urinary output increased, and vasopressors could be tapered off. The PaO_2/FiO_2 ratio improved from 173 to 386 on the next day. The authors suggest that the likely mechanism of the therapeutic effect of PMX would be the absorption of inflammatory cytokines and neutrophil elastase. The success in the treatment of multiple organ failure with PMX might suggest a new strategy for severe Legionella pneumonia. Further investigation would be required to determine the appropriate indication and the cycles and frequencies of PMX treatment.

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