

## Using awake ECMO and pulmonary rehabilitation strategies to PJP in a kidney transplant patient

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Even though extracorporeal membrane oxygenation (ECMO) is emerging as the rescue therapy of severe acute respiratory distress syndrome (ARDS), the mortality rate of *Pneumocystis jirovecii* pneumonia (PJP) requiring ECMO is still very high. We report our experience using awake ECMO and pulmonary rehabilitation strategies for PJP induced ARDS in kidney transplant recipient who was refractory to standard medical treatment and mechanical ventilator support. A 25-year-old woman was presented with fever, cough, dyspnea. The patient received a living-donor kidney transplantation 18 months ago, and had maintained immunosuppressive therapy. At emergency department, she had high fever (39.0°C), stable blood pressure (150/95 mmHg), sinus tachycardia (129 beats/min) and tachypnea (27 breaths/min). Laboratory results revealed leukocytosis (11,800/mm<sup>3</sup>) and elevated C-reactive protein level (9.87 mg/dL). A chest X-ray showed bilateral patch consolidations. Arterial blood gas analysis in room air revealed hypocapnia. Immunosuppressive drugs were minimized, and empirical antibiotics were started. Her oxygen demand increased gradually and endotracheal intubation was done for mechanical ventilation on hospital day (HD) 2. After diagnostic bronchoscopy, intravenous Trimethoprim-sulfamethoxazole (TMP-SMX, 20mg TMP/kg/d) was administered and systemic steroid was added for PJP treatment. Bronchoalveolar lavage PJP by PCR was positive. While on mechanical ventilation, severe impairment of oxygenation developed, consistent with severe ARDS. On HD 9, venous-venous ECMO was introduced. Even treated with Clindamycin and Primaquine following TMP-SMX for 4 weeks, ECMO weaning was impossible because of persistent hypoxemia. Tracheostomy was done on HD 31. We stopped sedatives and started an awake ECMO strategy. With active pulmonary rehabilitation and psychological support, hypoxia and chest X-ray findings improved gradually. Consequently, she could do bedside-exercise using bicycle ergometer. Eventually ECMO was weaned off on HD 59. Since she had no hypoxia in room air, she was discharged on HD 81. After 3 months later, she was breathing unaided and she had returned to normal daily activities.

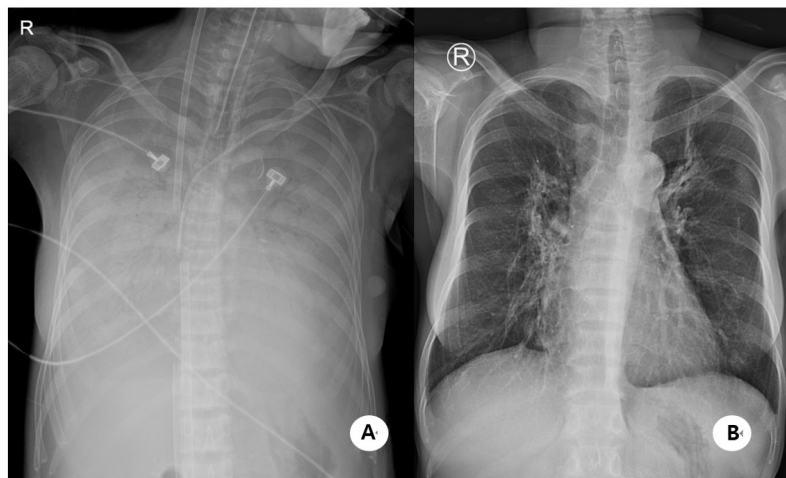


FIGURE. Chest imaging in patient with *Pneumocystis jirovecii* pneumonia. (A) Chest x-ray performed after extracorporeal membrane oxygenation (ECMO) placement on hospital day 9. (B) Three weeks after weaning from ECMO and discharge.<sup>4,5</sup>