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Lung transplantation team's view

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Introduction Over the past decades, lung transplantation has become the only treatment method for end-stage lung disease, and the number of lung transplantations worldwide is rapidly increasing. In Korea, the demand for lung transplantation is continuously growing, but deaths while waiting are still high due to the lack of donors. In this respect, proper donor management is critical to minimize further damage and improve organ function to maximize the available donor pool. Physicians who care for brain death patients should evaluate carefully with the possibility of donation in mind, and the donor should be effectively managed in an intensive care unit. This review provides a current update on appropriate donor management from the perspective of the lung transplant team. Donor lung management strategies Severe brain injury can result in neurogenic pulmonary edema. This condition arises from elevated pulmonary hydrostatic pressure caused by a sudden surge in circulating catecholamines and increased expression of inflammatory mediators. This leads to heightened lung capillary permeability and interstitial edema. Brain-dead donors also face a heightened risk of aspiration, infection, and mechanical ventilation-related injury. As a result, a minimal percentage of lungs from these donors are deemed suitable for transplantation. According to KONOS data, lungs are procured and transplanted from a mere 12% of the brain-dead donor population. A protective ventilation strategy plays a crucial role in the respiratory management of potential lung donors, helping to reduce the risk of ventilator-induced lung injury further. This strategy entails: a) Tidal volume set at 6–8 ml/kg of predicted body weight (PBW). b) Maintaining plateau pressure below 30 cmH2O. c) Ensuring adequate positive end-expiratory pressure (PEEP) within the 8-10 cm H2O range. d) Maintaining FiO2 below 0.5 to achieve and maintain SpO2 levels between 92% and 95%. Implementing a lung-protective ventilation protocol has demonstrated significant benefits in a randomized controlled study, including an increase in donor eligibility compared to conventional strategies (95% vs. 54%) and a higher number of lungs suitable for transplantation (54% vs. 27%). Additionally, it is advisable to adopt a conservative fluid management approach. Hormone therapy with vasopressin, methylprednisolone, and thyroid hormone after brain death in combination with a central venous pressure (CVP) <10 mmHg significantly improves utilization of the heart and lungs for transplant without affecting other organ systems. This careful management helps prevent excessive crystalloid infusion, which

can negatively impact arterial oxygenation. To prevent aspiration, the head of the bed should be elevated to 30°, and the endotracheal tube balloon should be inflated to a pressure of 25 cmH2O. Bronchoscopy is conducted promptly to ensure a precise assessment of conditions such as bronchitis and aspiration and to obtain sputum samples or perform bronchoalveolar lavage when there is suspicion of infection. It is also employed to remove stagnant secretions that could potentially lead to atelectasis or inhalation injury. According to the recent ISHLT (International Society for Heart and Lung Transplantation) statement, the following protocols and recommendations should be followed for the management of potential organ donors: (a) Evaluate the following: Electrocardiogram, chest X-ray, Arterial Blood Gas Analysis, Urgent sputum study, Gram stain, AFB stain, and Fungus staining, especially if infection is suspected. (b) Optimize Volume Status: Target CVP between 6-10 mm Hg. (c) Adjust Vasopressors: Maintain Mean Arterial Pressure (MAP) above 60 mm Hg. Target Vasopressin dose below 2.4 Units/hr or Dopamine below ten mcg/kg/min. (d) Implement Protective Ventilation Strategies. (e) Correct Acidosis. (f) Correct Hypoxemia: Target PaO2 between 80-100 mmHg. Maintain SaO2 above 95%. (g) Control Hyperglycemia, aiming for blood glucose levels between 4-10 mmol/L. (h) Hormonal Resuscitation: If the donor is on Dopamine, initiate Vasopressin infusion at 2.4 U/hr. If the donor is on Vasopressin, start Dopamine at four ug/kg/min. (i) For donors with decreased preload, prefer crystalloid solutions such as 0.9% sodium chloride or Ringer's lactate for fluid repletion and maintenance. Managing donor lungs during the COVID-19 pandemic requires careful consideration of the following factors: a) If the donor has been exposed to a confirmed or suspected case of COVID-19 within the past ten days: The organ may be considered for cardiothoracic transplant if the donor has been asymptomatic and > seven days since exposure and at least one negative SARS-CoV-2 PCR test and CT chest negative for pulmonary infection. B) If the donor has a history of confirmed COVID-19, may be considered for transplant if clinical resolution of symptoms due to COVID-19 and >21 days from onset of symptoms in an immunocompetent donor and no significant pulmonary disease due to COVID-19 and at least one negative SARS-CoV-2 PCR and CT scan of the chest negative for evidence of pulmonary infection/chronic lung injury. In conclusion, active donor management can prevent further injury and improve donor lung quality. Furthermore, it is time to actively introduce other strategies for expanding the donor pool, such as donation after cardiac death and ex vivo lung perfusion.