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A Comparative Analysis of Cardiopulmonary Bypass and Extracorporeal Membrane Oxygenation in Lung Transplantation

Samina Park [1], Hyun Joo Lee, Kwon Joong Na, In Kyu Park, Chang Hyun Kang and Young Tae Kim

[1] Thoracic and Cardiovascular Surgery, Seoul National University Hospital, Republic of Korea

Introduction: Cardiopulmonary Bypass (CPB) and Extracorporeal Membrane Oxygenation (ECMO) are commonly employed strategies for supporting lung transplantation, each with its own set of advantages and disadvantages. In this study, we conducted a comparative analysis of operative outcomes following lung transplantation based on the choice of cardiopulmonary support strategy.

Methods: We conducted a retrospective analysis of lung transplants performed between January 2010 and June 2023. Inclusion criteria encompassed patients who required cardiopulmonary support (conventional CPB or central ECMO) during the transplantation. Cases involving peripheral ECMO, veno-venous ECMO, heart-lung transplantation, and lung-liver transplantation were excluded from this study.

Results: Our analysis comprised 133 patients, with a mean age of 53 years, and 59% of them were male. Five patients were transitioned from ECMO to CPB due to unstable vital signs. The total operation time in the ECMO group was notably shorter than that in the CPB group (CPB vs. ECMO = 581±105 minutes vs. 437±80 minutes; $p<0.001$). Furthermore, the duration of cardiopulmonary support was shorter in the ECMO group (CPB vs. ECMO = 296±57 minutes vs. 272±60 minutes; $p=0.027$). The 30-day mortality rate was 5.3%, with no statistically significant difference between CPB and ECMO groups (CPB vs. ECMO = 2.1% vs. 7.0%; $p=0.231$). The quantity of red blood cell transfusions was comparable between the two groups (CPB vs. ECMO = 8.9±8.4 units vs. 8.3±7.5 units; $p=0.654$). However, there was a trend toward higher fresh frozen plasma transfusion in the CPB group (CPB vs. ECMO = 6.7±5.5 units vs. 4.7±6.9 units; $p=0.087$) and significantly more platelet transfusions in the CPB group (CPB vs. ECMO = 5.2±4.7 units vs. 1.6±5.9 units; $p<0.001$). Notably, 5-year survival rates showed no significant difference between the two groups (CPB vs. ECMO = 59% vs. 59%; $p=0.930$).

Conclusion: Central ECMO offers the advantages of shorter operation times and reduced requirements for blood transfusions compared to conventional CPB in the context of lung transplantation. These findings provide valuable insights into the selection of cardiopulmonary support strategies, potentially improving patient outcomes and resource utilization.