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Commentary: Lung transplant: No support is best

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Central Message: A retrospective analysis of institutions with varying intraoperative support suggests off-pump lung transplant has the lowest risk of PGD. Further analyses are required to fully ascertain the truth.

Central Picture Legend: Stephanie H. Chang MD, Assistant Professor of Cardiothoracic Surgery; Matthew C. Henn MD, Assistant Professor of Cardiac Surgery

The optimal intraoperative support for lung transplant remains undetermined. For patients who are able to tolerate single lung ventilation with no significant pulmonary hypertension, lung transplant (single or double) may be performed without any extracorporeal life support (ECLS). For patients requiring ECLS, both cardiopulmonary bypass (CPB) or extracorporeal membrane oxygenation (ECMO) are options. Single center studies have compared CPB versus ECMO, and have demonstrated decreased mortality, blood use, and primary graft dysfunction (PGD) with ECMO support\(^1\), though other studies have shown excellent outcomes with CPB support\(^2\). Other single center studies have shown decreased PGD in patients supported with intraoperative veno-arterial (VA) ECMO versus off-pump\(^3\). Overall, the data remains limited by retrospective single institution studies with no consensus regarding the ideal intraoperative support for lung transplant.

Loor et al presents a registry analysis evaluating 852 lung transplants from 8 institutions, with 422 (50%) off-pump, 273 (32%) ECMO, and 157 (18%) bypass. The primary endpoint was PGD grade 3, with a PGD3 rate of 12.1% with off-pump, 28.9% of ECMO, and 42.7% of CPB patients. The data also demonstrated that the off-pump cohort had the lowest mortality,
reintubation, tracheostomy, postoperative ECMO requirement, and length of stay. Additionally 1-year survival was 91% for the off-pump group, versus 84% in the ECMO group and 84% in the CPB group.

While this study shows a PGD 3 OR of 4.24 in CPB vs off-pump, 2.24 in ECMO vs off-pump, and 1.89 in CPB vs ECMO, there are some factors that should be taken into account. First, the centers all varied with regard to institutional practice, which creates significant selection bias. The rate of CPB use ranged from 0-67%, while off-pump ranged from 0-79% for off-pump use. This may be related to varying surgical approach – some centers used an anterior thoracotomy/clamshell approach, while others utilized a sternotomy (which often requires CPB).

Blood transfusion requirement, which is likely higher in the CPB group and can be associated with development of PGD, was also not measured in this study. Additionally, the recipient demographics are very different, with a statistically significant higher rate of obstructive disease, lower mean pulmonary artery pressure, decreased preoperative hospitalization and no preoperative ECMO use in the off-pump group. Each of those factors can play a role in the development of PGD.

While this study is interesting, the outcomes are still hampered by inherent selection bias. For many of these patients who were placed on ECMO or CPB, the patient may not have been a candidate for off-pump transplant. A subset analysis comparing modes of support and rates of PGD3 for patients who would tolerate off-pump transplant including those with no significant hypoxia (such as oxygen requirement ≤ 6), no severe pulmonary hypertension, and who are not hospitalized preoperatively would be helpful. Further, prospective evaluation in this patient population would be ideal. While these data would be helpful for transplant surgeons to decide
optimal mode of support, most surgeons would agree that in patients that can tolerate it, no support is best.
**References:**


