The rapid transformation of extracorporeal support in lung transplantation

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Primary allograft dysfunction (PGD) after lung transplantation is a significant concern for transplant surgeons and remains a major cause of near-term mortality.¹ Fortunately, options for aggressive support of patients with PGD have become more widely available, including extracorporeal membrane oxygenation (ECMO).²⁻⁴ In the current issue of the *Journal*, Mehaffey and colleagues⁵ provide long-term follow-up of early use of ECMO, initially reported 14 years ago, for management of post-transplant PGD related to neurogenic pulmonary edema. Although this is itself an isolated case, its publication underscores both the potential for favorable results with aggressive extracorporeal support and the importance of long-term data on functional outcomes for these patient, which are currently lacking in the lung transplant literature.

The use of ECMO in support of lung transplantation has dramatically expanded in the past decade. Favorable outcomes have been reported by a number of centers with extracorporeal support for PGD and other forms of respiratory failure in the post-transplant period.²⁻⁴ The availability of a viable rescue method also has facilitated broadened definitions of “acceptable donors,” thereby increasing the limited supply of donor organs. However, the use of ECMO in lung transplantation has rapidly expanded beyond mere postoperative support. The technology is now frequently used to extend patient viability before transplant until a suitable lung donor becomes available, with several centers demonstrating outcomes similar to those of patients who underwent transplantation with conventional ventilator support.^{6,7} The impact of ECMO on PGD may begin even earlier because ECMO has made the journey into the operating room, replacing conventional cardiopulmonary bypass in many centers. Evolving data indicate this approach may reduce inflammation and limit the development of allograft dysfunction.^{8,9}

In their discussion of the case, Dr Mehaffey and colleagues⁵ discuss the potential to expand the lung donor

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Central Message

The use of ECMO has increased in all phases of lung transplant care, resulting in improved patient outcomes and expanded donor use coupled with investigation of ex vivo perfusion strategies.

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pool by improving the use of marginally functioning lungs with the aid of technology such as ECMO to allow for in vivo recovery after transplant. Although this approach may be the state of the art currently, the focus is rapidly shifting toward augmentation of our ability to assess and rehabilitate donor lungs preoperatively. The exploding research and clinical use of ex vivo lung perfusion (EVLP) techniques potentially represent the next giant step forward in the use of extracorporeal technology to improve the field of lung transplantation. Use of EVLP allows a more complete longitudinal assessment of potentially evolving lung injuries, such as aspiration pneumonia or lung contusion, commonly seen in organ donors. Further, effective interventions for these conditions, such as high-dose antibiotic treatment for donor pneumonia, may be administered in the EVLP environment without exposing the recipient to the risks associated with both the marginally functioning lung and the treatment of the underlying condition.¹⁰ As lung transplant surgeons strive to increase donor use while maintaining safe transplant outcomes, expanded use of both ECMO and EVLP is likely to play a critical role, and it will be important to assess the long-term functional outcomes in addition to celebrating the near-term successes.

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