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Commentary: A tool in the arsenal for persistent air leaks

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CENTRAL MESSAGE

Allogenic cell sheet transplantation is a promising application of regenerative medicine for managing pulmonary air leaks. More translational work is needed before implementation.

Pulmonary air leak (PAL) is a pervasive problem for thoracic surgeons that often presents a challenge to postoperative management. Its contribution to postoperative morbidity is significant; patients experiencing PAL may develop atelectasis and occasionally pneumonia, parapneumonic effusion, and empyema. In addition, they are at an increased risk of ICU (re)admission and increased length of hospital stay.[1] In their article, Kanzaki and colleagues[2] propose transplanting allogenic cell sheets (ACSs) as a bioartificial pleural substitute to address this problem. This technique is promising application of the rapidly developing field of regenerative medicine in thoracic surgery.

The parenchymal injury created as part of the rat air leak model was uniformly fatal within 1 hour in the authors' previous experiments.[3] In contrast, ACS transplantation produced immediate closure of the parenchymal injury, and all animals that underwent ACS transplantation survived until the 28-day follow-up. In addition, the logistics of ACS transplantation are more compatible with clinical practice than autologous cell sheets. ACSs can be prepared in advance and are available at the time of surgery, whereas the process of procuring and culture autologous cell sheets requires at least 4 days.[3]

Several steps remain before this technique can be translated into clinical practice. First, the shortcoming of the rat air leak model is the absence of chest tubes. Without a chest tube, the air leak cannot truly be quantified. In addition, apposition of the lung and parietal pleural surface is not monitored. Because poor apposition is often associated with—and likely contributes to—the persistence of PALs, particularly with larger lung resections such as lobectomies.[4] Apposition and successful resolution of PAL in an air leak model is an essential step in translating the authors' technique into clinical practice.

Ideally, ACS transplantation will emerge as a preventive strategy. Most cases of PAL are amenable to management with chest tube drainage and time, and thus application to all patients is not necessary. Because the authors' methods require intraoperative placement, patient selection is a necessity.[2] Predictive models and careful clinical judgment are important in determining when to perform ACS transplantation at the time of the index operation. Fortunately, several such models are currently in development.[4-7] Nonetheless, analysis of the cost-effectiveness of ACS transplantation, whether selective or routine, will be critical to support its implementation in clinical practice.

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