Commentary: Bruised donor lungs—they may not be pretty, but they will still work

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As an institution that is constantly looking for ways to expand the donor pool in lung transplantation, we would like to thank Schwarz and colleagues† for presenting their impressive experience in this issue of the Journal. Their article provides the strongest evidence to date that lungs with pulmonary contusions can serve as excellent organs for lung transplantation.

Schwarz and colleagues have importantly highlighted that lungs with contusions from traumatic injury often come from younger, otherwise healthy donors with excellent lung function. If there is evidence of healthy gas exchange with an acceptable partial pressure of oxygen (PaO₂) level, the lungs should be evaluated for transplantation. This report supports that recommendation by demonstrating similar proportions of primary graft dysfunction and duration of mechanical ventilation. Our anecdotal experience corroborates these findings. More importantly however, Schwarz and colleagues were able to demonstrate comparable long-term graft function and survival.

For lungs that have severe but localized contusions and apparently low PaO₂, we appreciate the authors’ recommendation to consider these lungs for either single lung or lobar transplantation, depending on the extent of injury. We also recognize that the authors did not confound their “polytrauma contusion” group by including lobar transplants with contused lobes removed. The proportion of lobar transplants was similar across the groups. We routinely obtain pulmonary venous gases at the time of procurement to determine whether individual lobes have adequate gas exchange.

The Vienna Lung Transplant Group has previously advocated for the routine use of intraoperative venoarterial extracorporeal membrane oxygenation (ECMO) to protect grafts from reperfusion injury.² Schwarz and colleagues demonstrate that the use of ECMO can be similarly applied to contused lungs with 96% ECMO utility in this group. We have similarly found that these organs tolerate the low doses of anticoagulation needed for ECMO. For bilateral transplantation, we recommend implantation of the side with less severe contusions first. Cardiopulmonary bypass should be avoided, because high-dose heparin and disturbed coagulation status can lead to expansion of pulmonary hematomas.

However, we do caution against the authors’ recommendation to assess these organs with pulmonary contusions with ex vivo lung perfusion (EVLP). Although their experience with EVLP may indeed be favorable, their data indicate that only 9% of the “polytrauma contusion” group actually underwent EVLP. We have found that EVLP can be detrimental in this context. Because of the nature of the injury, which is felt to be secondary to disruption of alveoli and alveolar capillaries, EVLP perfusate tends to leak and accumulate in the interstitium.³ The contused areas become edematous, and even healthy parts of the lung can be infiltrated with edema. Thus, it is our practice to proceed directly to transplantation if gas exchange function is good at the donor site.

As experienced by the authors, in severely contused lungs, we have also seen residual pneumatoceles after
resolution of the alveolar and interstitial hematoma. Although the lesions themselves do not require treatment, necrotizing pneumonia or secondary infection should be considered in patients with a troubled clinical course.4

This work by Schwarz and colleagues will be instrumental in encouraging the use of this often-overlooked donor pool. We look forward to the publication of more series to help standardize acceptable parameters for contused lungs and better guide donor evaluation.

References

Commentary: “Cont”used though still used donor lungs for transplantation

Dirk Van Raemdonck, MD, PhD, Laurens J. Ceulemans, MD, PhD, Robin Vos, MD, PhD, and Arne Neyrinck, MD, PhD

“Time heals all wounds; meanwhile, you have to move along with it” is a common sentiment meant to support an individual with a broken heart. Bruised tissues will discolor over time following the spectrum of colored pencils (Figure 1). Likewise, pulmonary contusion may take a few weeks to fully heal.

Organ shortage remains the most important hurdle to offering life-saving lung transplantation to more patients on the waiting list. Based on data from the Organ Procurement and Transplantation Network for 2019, the rate of lung transplantation from deceased donors was only 22.9% (n = 2714), lower than that of heart (29.9%) and liver (70.5%).¹ Donor lung utilization can be boosted by active donor management,² acceptance of nonstandard criteria donor lungs at offer,¹ and organ quality assessment in the donor hospital.⁴

Motor vehicle accident was the mechanism of death in nearly 10% (1146 of 11,870) of deceased organ donors in the United States in 2019.¹ Severe chest injury in a trauma victim may result in pulmonary contusion with endobronchial bleeding and ventilator-induced pneumonia, reducing the likelihood of the victim being considered a suitable lung donor. However, contused lungs in a polytrauma victim may show sufficient organ function to support life. In this issue of the Journal, authors from the Vienna Lung Transplant Group report that donor lungs from selected polytrauma victims can be safely transplanted.

CENTRAL MESSAGE
Bruised though not unused; contused donor lungs from polytrauma victims with good gas exchange can be safely transplanted with comparable outcome to noncontused lungs.

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