Although this study does not provide sufficient evidence to make intraoperative ECMO the gold standard, it certainly adds credence to the view that this significant additional intervention can improve outcomes with little risk. I applaud the authors for their high-volume excellent outcomes, and their addition to this important body of research.

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Commentary: Central defense on trial

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In their article in this issue of the *Journal*, Hoetzenecker and colleagues¹ evaluate the utility of intraoperative extracorporeal membrane oxygenation in lung transplantation, endorsing its routine use as a means of reducing primary graft dysfunction. This analysis is timely and relevant and is presented against a backdrop of high-volume transplantation. Their results, although commendable, remain nonetheless susceptible to critique, particularly from a methodologic standpoint. In the quest to establish a paradigm of care, Hoetzenecker and colleagues¹ gambled against including neither a comparative nor a control arm.

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Disclosures: Authors have nothing to disclose with regard to commercial support. Received for publication Sept 27, 2019; revisions received Sept 27, 2019; accepted for publication Sept 29, 2019; available ahead of print Oct 9, 2019.

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J Thorac Cardiovasc Surg 2020;160:331-2

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2019.09.124>

Left-right: Heather K. Hayanga, MD, MPH, J. W. Awori Hayanga, MD, MPH, Ankit Dhamija, MD

CENTRAL MESSAGE

Extracorporeal support is a growing strategy of choice for intraoperative support in lung transplantation.

As such, they expose themselves to unmitigated confounding and bias. Their analysis is shielded from the tempering, moderating benefit of randomization, which might also otherwise have afforded a more objective lens through which to view their findings. This is particularly to the point in the weight placed on the comparison with cardiopulmonary bypass. The absence of propensity matching further compounds the confounding exacerbated by the prevailing fleeting consensus regarding the definition of primary graft dysfunction.²

Nonetheless, we have been afforded a snapshot of an operative protocol that has yielded respectable outcomes. A marked departure from the US experience, however, is manifest in the reporting of chronic obstructive pulmonary disease as the predominant indication for transplantation. Allocation in the United States, in contradistinction, is determined primarily by the lung allocation score (LAS), which is predicated on clinical severity and not wait-list

time and thus ultimately favors interstitial lung disease.³ The lack of an objective estimation of clinical severity in the report, when coupled with the fact that only 4 out of 160 candidates required mechanical ventilation, raises credible doubt regarding clinical acuity in this cohort. The reader is rendered unable to draw meaningful comparisons and may surmise that intraoperative support may not necessarily have been required in all cases.

The contemporary US experience thus provides a contrasting rather than corroborating testimony. There has been increased demand for bridging strategies.⁴ This has increased the proportion of patients who undergo peripheral cannulation before transplantation and placed growing emphasis on ambulation and wakefulness.⁵ Bridging has also popularized accompanying preferences, such as thoracotomy versus clamshell incisions. As such, the endorsement of central cannulation by Hoetzenecker and colleagues¹ somewhat attenuates both the deviation from a de facto clamshell approach and the very generalizability of the results, no matter how compelling. Furthermore, somewhat paradoxically, the study overlooks the fact that many transplantations require no form of support whatsoever, which ironically is true for candidates with chronic obstructive pulmonary disease, the very majority of their cohort.

Regardless, one must acknowledge the advantage proffered through intraoperative support. As the popularity of extracorporeal membrane oxygenation continues to outpace existing evidence, however, the challenge gravitates

to the surgical community to establish practice guidelines. Analyses such as these provide a form of adjudication as to what we do and perhaps simultaneously uncover what we should not do. The acceptance of intraoperative extracorporeal membrane oxygenation as a matter of routine is a concept that may continue to grow in popularity, but enthusiasm should likely be tempered by a sober assessment of the arithmetic of risk and benefit and not necessarily remain predicated on central cannulation.

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