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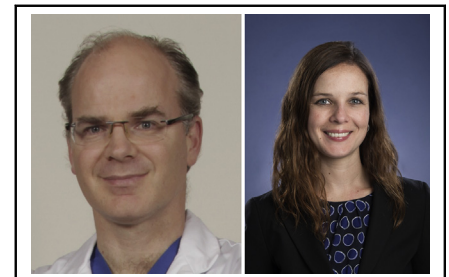
## Commentary: Innovative strategies in lobar lung transplantation

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In their article in this issue of the *Journal*, Nakajima and colleagues<sup>1</sup> examine their functional outcomes and survival in recipients of standard living-donor lobar lung transplantation (LDLLT), native upper lobe-sparing LDLLT, inverted right-to-left LDLLT, and single-lobe LDLLT.<sup>1</sup> As the world leaders in LDLLT, the authors should be congratulated for their attempts to continuously increase the donor pool in their country through the development of novel techniques for managing size mismatches.

Although the vast majority of lung transplantations performed worldwide are from cadaveric donors, the lack of organs for small-sized recipients continues to be an issue faced by many lung transplant programs. Lobar lung transplantation remains a rarely performed procedure, yet outcomes can be very good when done in experienced transplant centers.<sup>2,3</sup> LDLLTs are performed even more rarely, owing to the increased complexity of performing the donor lobectomy, the risks to healthy donors, and the availability of cadaver organs in many countries.

LDLLT is a good option for recipients, with excellent long-term outcomes.<sup>4,5</sup> Although lobar transplantation has been described for small-sized recipients, the original technique of transplanting lobes bilaterally (eg, right lower lobe in the right chest and left lower lobe in the left chest) presents difficulties for larger recipients, who might not get adequate functional lung from the donor and may be left with pleural space problems if the lobes they receive are too small. Thus, the technique of sparing



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### CENTRAL MESSAGE

Living-donor lobar lung transplantation can be done with good outcomes using various techniques, including native upper lobe-sparing, inverted technique, and oversized single lobe transplantation.

the native upper lobes that have some residual function and transplanting lower lobes bilaterally ameliorates these issues and provides an option for sick larger recipients who might not survive to cadaveric transplantation.<sup>6</sup> Another technique to provide options for larger recipients is inverted right-to-left LDLLT, with transplantation of the right lower lobe into the left chest and either preservation of the native right lung or transplantation of 2 right lower lobes into the recipient's right and left chest with or without preservation of the native upper lobes. This technique takes advantage of the larger size and perfusion of the right lung with implantation of the 2 largest donor lobes, with good intermediate outcomes.<sup>7,8</sup>

The authors describe careful preoperative planning and meticulous intraoperative technique with excellent outcomes. They observed very limited numbers of bronchial complications, particularly for the inverted right-to-left LDLLT. In these situations, the bronchial anastomosis of the right lower lobe is performed on the native left upper lobe bronchus to avoid tension, and the bronchial stump from the native left lower lobe is covered with pericardial fat pad. They demonstrate that these novel techniques of inverted lobes, native upper lobe-sparing, and single lobe transplantation had comparable functional outcomes to standard LDLLT, with excellent 6-minute walk distances and 5-year survival of >75% in all groups.

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Although many transplant centers do not have LDLLT programs, the techniques and outcomes described in this article may be applied to cadaveric lobar transplantation and should be considered for small-sized recipients who have limited access to small-sized donors. Also, importantly, this series highlights what may be possible in situations of limited resources with meticulous planning, optimal surgical and perioperative care, and complete follow-up.

## References

1. Nakajima D, Tanaka S, Ohsumi A, Date H. Outcomes of novel surgical procedures for graft size mismatch in living-donor lobar lung transplantation. *J Thorac Cardiovasc Surg Tech*. 2020;3:388-92.
2. Slama A, Ghanim B, Klikovits T, Scheed A, Hoda MA, Hoetzenecker K, et al. Lobar lung transplantation—is it comparable with standard lung transplantation? *Transpl Int*. 2014;27:909-16.
3. Campo-Canaveral De La Cruz JL, Dunne B, Lemaitre P, Rackauskas M, Pozniak J, Watanabe Y, et al. Deceased-donor lobar lung transplant: a successful strategy for small-sized recipients. *J Thorac Cardiovasc Surg*. 2020 [Epub ahead of print].
4. Date H, Aoe M, Sano Y, Nagahiro I, Miyaji K, Goto K, et al. Improved survival after living-donor lobar lung transplantation. *J Thorac Cardiovasc Surg*. 2004;128:933-40.
5. Starnes VA, Bowdish ME, Woo MS, Barbers RG, Schenkel FA, Horn MV, et al. A decade of living lobar lung transplantation: recipient outcomes. *J Thorac Cardiovasc Surg*. 2004;127:114-22.
6. Aoyama A, Chen F, Minakata K, Yamazaki K, Yamada T, Sato M, et al. Sparing native upper lobes in living-donor lobar lung transplantation: five cases from a single center. *Am J Transplant*. 2015;15:3202-7.
7. Chen F, Miyamoto E, Takemoto M, Minakata K, Yamada T, Sato M, et al. Right and left inverted lobar lung transplantation. *Am J Transplant*. 2015;15:1716-21.
8. Chen-Yoshikawa TF, Tanaka S, Yamada Y, Yutaka Y, Nakajima D, Ohsumi A, et al. Intermediate outcomes of right-to-left inverted living-donor lobar lung transplantation. *Eur J Cardiothorac Surg*. 2019;56:1046-53.