



Adopting Individualized Strategies to Prevent Large-For-Size Syndrome in Adult Liver Transplant Recipients: The Graft Morphology Should Also Be Taken Into Account

Guang-Peng Zhou^{1,2}, Lin Wei^{1,2} and Zhi-Jun Zhu^{1,2*}

¹Liver Transplantation Center, National Clinical Research Center for Digestive Diseases, Beijing Friendship Hospital, Capital Medical University, Beijing, China, ²Clinical Center for Pediatric Liver Transplantation, Capital Medical University, Beijing, China

Keywords: large-for-size syndrome, *ex vivo* right posterior sectionectomy, size mismatch, graft morphology, right anteroposterior vertical distance

A Forum discussing:

A Novel Strategy for Preventing Posttransplant Large-For-Size Syndrome in Adult Liver Transplant Recipients: A Pilot Study

by Pu X, He D, Liao A, Yang J, Lv T, Yan L, Yang J, Wu H, Jiang L (2022). *Transpl Int* 35:10177. doi: 10.3389/ti.2021.10177

Large-for-size syndrome (LFSS) is a less common but life-threatening complication following adult liver transplantation during the early post-transplant period, characterized by postoperative liver necrosis, vascular complications, and primary nonfunction due to severe liver graft compression (1). In this issue of Transplant International, Pu et al. reported a novel surgical technique of *ex vivo* right posterior sectionectomy while preserving the right hepatic vein in the liver graft to prevent posttransplant LFSS in adult liver transplant recipients, which was successfully performed in all five recipients discharged without procedure-related complications (2). Pu et al. should be congratulated for describing a feasible intervention to save patients from the potential risk of LFSS. However, the graft morphology should also be taken into account when adopting this novel surgical treatment.

Pu et al. selected graft-recipient weight ratio (GRWR) combined with graft weight (GW)/right anteroposterior (RAP) as a new “LFSS predictor,” in which both $GRWR > 2.5\%$ and $GW/RAP > 100 \text{ g/cm}$ indicated the need for reduction of the right liver graft. However, this new “LFSS predictor” has its intrinsic limitation, which only considers the graft weight and the depth of the lower right hemithorax of the recipient, but not the morphological parameters of the graft, especially the RAP vertical distance and the longest horizontal distance (3). The morphology of the liver grafts may differ among individuals. Some large-volume livers exhibit a short, “squat” shape (relatively short and thick right liver span). In contrast, others have a narrow, flat, and elongated morphology (relatively long and thin right liver span) (3). Therefore, both GRWR and GW/RAP could not fully indicate the possibility of severe compression of the right liver graft from the recipient’s rib cage. Within the past several years, our center has also completed several *ex vivo* right posterior sectionectomy cases in both pediatric and adult liver transplant recipients. Despite the advantages of *ex vivo* right posterior sectionectomy, as described by Pu et al., it must be admitted that this surgical procedure still carries increased risks of surgical complications, especially in patients with decompensated cirrhosis with a high MELD score (1, 4). Based on



OPEN ACCESS

*Correspondence:

Zhi-Jun Zhu
zhu-zhijun@outlook.com

Received: 31 May 2022

Accepted: 17 August 2022

Published: 05 September 2022

Citation:

Zhou G-P, Wei L and Zhu Z-J (2022) Adopting Individualized Strategies to Prevent Large-For-Size Syndrome in Adult Liver Transplant Recipients: The Graft Morphology Should Also Be Taken Into Account. *Transpl Int* 35:10683. doi: 10.3389/ti.2022.10683

our experience and others, the size discrepancy between the anteroposterior dimensions of the graft and the longest RAP of the recipient should still be considered a first-line index for evaluating the occurrence of the LFSS. Thus, the choice of the liver segments to be resected should be based on the combination of the anthropometrics of the donor graft with that of the recipient (1, 5). The anteroposterior dimension of the graft can be accurately measured on the back table to provide a precise parameter for determining the necessity of right posterior sectionectomy. If the right liver graft vertical distance is less than the longest RAP vertical distance of the recipient, graft reduction with resection of the right posterior sector (segment 6–7) may not be necessary. In this condition, left lateral lobectomy or left hemihepatectomy may be more appropriate with their convenience and relatively low risk (6). Nevertheless, concerns remain that a limited graft reduction such as left lobectomy is very unlikely to avoid rib compression over the right liver (3). Recently, Paterno et al. provided a further solution named “bilateral marginal costotomy,” which rescued a liver transplant recipient from severe graft compression from the bilateral narrow rib cages after the failed temporary abdominal closure (7). Thus, marginal costotomy can be performed either as a primary or adjunctive treatment to avoid graft compression due to the ribs after the implantation of a large-for-size liver graft or as a rescue treatment after conventional interventions failed to relieve allograft compression.

Collectively, combining the volumetric and morphological parameters of the donor liver with the anthropometrics of the recipient may be more beneficial in determining the individualized strategies to prevent the occurrence of LFSS in

adult liver transplant recipients when facing donor-recipient mismatching.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

Authors G-PZ, LW, and Z-JZ contributed equally to the preparation and editing of this letter to the editors. The final version was unanimously approved by all authors.

FUNDING

This study was supported by grants from the Capital's Funds for Health Improvement and Research (2020-1-2024) and Beijing Postdoctoral Research Foundation. The funding body had no role in the design of the study and writing of the manuscript.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

REFERENCES

- Addeo P, Noblet V, Naegel B, Bachellier P. Large-for-Size Orthotopic Liver Transplantation: a Systematic Review of Definitions, Outcomes, and Solutions. *J Gastrointest Surg* (2020) 24:1192–200. doi:10.1007/s11605-019-04505-5
- Pu X, He D, Liao A, Yang J, Lv T, Yan L, et al. A Novel Strategy for Preventing Posttransplant Large-For-Size Syndrome in Adult Liver Transplant Recipients: A Pilot Study. *Transpl Int* (2021) 35:10177. doi:10.3389/ti.2021.10177
- Allard MA, Lopes F, Frosio F, Golse N, Sa Cunha A, Cherqui D, et al. Extreme Large-For-Size Syndrome after Adult Liver Transplantation: A Model for Predicting a Potentially Lethal Complication. *Liver Transpl* (2017) 23:1294–304. doi:10.1002/lt.24835
- Nagatsu A, Yoshizumi T, Ikegami T, Harada N, Soejima Y, et al. *In Situ* Posterior Graft Segmentectomy for Large-For-Size Syndrome in Deceased Donor Liver Transplantation in Adults: A Case Report. *Transpl Proc* (2017) 49:1199–201. doi:10.1016/j.transproceed.2017.03.036
- Addeo P, Bachellier P, Noblet V. Combination of Donor Anthropometrics with Recipient Imaging to Improve Matching in Liver Transplantation. *Liver Transpl* (2022) 28:512–3. doi:10.1002/lt.26300
- Kim YM, Kwak BJ, Shim DJ, Kwon YK, Yoon YC. *In Situ* Left Lateral Sectionectomy in Deceased Donor Liver Transplantation: Could This Be Another Solution for a Large-For-Size Graft? A Case Report. *Transpl Proc* (2019) 51:3116–9. doi:10.1016/j.transproceed.2019.07.005
- Paterno F, Amin A, Lunsford KE, Brown LG, Pysopoulos N, Lee ES, et al. Marginal Costotomy: A Novel Surgical Technique to Rescue from “Large-For-Size Syndrome” in Liver Transplantation. *Liver Transpl* (2022) 28:317–20. doi:10.1002/lt.26252

Copyright © 2022 Zhou, Wei and Zhu. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.