

The relevance of the liver volume increase after ALPPS

With interest, we read the analysis by Lopez-Lopez et al. on the patient intrinsic factors related to liver growth after associating liver partition and portal vein ligation for staged hepatectomy (ALPPS).¹ All efforts to elaborate on the factors associated with liver regeneration can greatly benefit safe liver surgery. In the case of this particular paper, we would like to make some comments.

The authors identified height, weight and body mass index (BMI), a dependent variable of height and weight, amongst factors related to the standardized future liver remnant share (sFLR) before stage 2 and increase in sFLR between stages 1 and 2. However, sFLR is calculated by dividing the estimated Future Liver Remnant (FLR) by the calculated Total Liver Volume (TLV), that is based on body surface area (BSA): $TLV = -794.41 + 1267.28 \times BSA$.^{2,3} BSA is calculated from height and weight $(BSA = \sqrt{\text{height [cm]} \times \text{weight [kg]} / 3600})$.⁴ Indeed weight and height were negatively correlated to sFLR, in a similar manner as driving faster is correlated with shorter travel time and increased height is correlated with lower BMI. As height, weight, and by extend BMI, increase, calculated TLV increases and sFLR decreases. Predicting the increase of sFLR $(\frac{FLR2 - FLR1}{TLV})$ with height, weight and BMI, does not completely resolve this issue. The inclusion of these parameters in the multivariable analysis is problematic and could have influenced the other outcomes.

A factor missing from the discussion is the relevance of liver growth after ALPPS in relation to outcomes. The liver growth after ALPPS in terms of volume is substantial and rapid. However, the morbidity and mortality rates are still high, which casts doubt on the relevance of the rapid liver growth in volume. Indeed, in an analysis of patients with colorectal liver metastases who underwent ALPPS, none of the inter-stage volume increase parameters or volume parameters before stage 2 were associated with better outcomes.⁵ Neither were these variables included in the ALPPS risk score including all indications.⁶ These findings are important in the interpretation of the outcomes of the study by Lopez-Lopez et al., and highlight the relevance of liver function testing.⁷

Rapid liver growth is interesting and can greatly expand the possibilities in liver surgery. Analysis of the process can provide insight into the mechanism, but we should keep clinical relevance in sight. Only clinically relevant outcomes give clinical research a unified goal; the treatment of as many patients as possible with the best possible outcome.

CONFLICT OF INTEREST

The authors do not have any disclosures to report.

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Abbreviations: ALPPS, associating liver partition and portal vein ligation for staged hepatectomy; BMI, body mass index; BSA, body surface area; sFLR, the standardized future liver remnant share; TLV, total liver volume.

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