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# "Graft Recipient Weight Ratio" or "Graft Volume Standard Liver Volume Ratio" in clinical practice in living donor liver transplantation

We enjoyed the recently published article by Toshima et al,[1] demonstrating the importance of recipient BMI for choosing graft in living donor liver transplantation (LDLT) to prevent small-for-size graft syndrome (SFSS). They retrospectively analyzed the incidence of SFSS in 694 recipients who underwent LDLT according to required graft volume based on graft-to-recipient body weight ratio (GRWR) or graft weight to standard liver weight (GW/SLW) in strata of recipient body mass index (BMI). They concluded that GRWR was useful, but GW/SLW was not useful in obese recipients (BMI > 30 kg/m$^2$).

Small-for-size graft syndrome has high mortality and morbidity after LDLT because of early graft dysfunction. The importance of accurate estimation for required liver volume in LDLT has been growing with increased number of LDLT worldwide due to the shortage of donor organs. GW/SLW was proposed in 1995 by calculating standard liver volume using the formula, which includes body surface area.[2] However, the formula might have less generalizability because they calculated standard liver volume in 96 patients in one prefecture in Japan. In addition, the average of height and body weight were 164.8 cm and 56.5 kg, respectively. Therefore, it may be difficult to estimate standard liver volume and graft weight in obese donors and recipients. In fact, Toshima et al showed GW/SLW was not associated with SFSS in obese patients. GRWR has been another way to estimate required liver volume. Since GRWR could take the body weight of a recipient into account, it may give us a better estimation in obese patients.

The estimation of graft weight has been performed using volumetric analysis by three-dimensional computed tomography (CT). However, the discrepancy between estimated graft volume and actual graft weight are often observed, and can potentially cause SFSS. A study showed that estimated liver volume was the largest using the venous phase of enhanced CT, while the smallest using unenhanced CT.[3] In addition, estimated liver volume by volumetry is provided as "volume" (i.e. mL), while actual graft size is measured by "weight" (i.e. g). To address this difference, another study suggested using conversion factor (1.20 mL/g) in estimation of graft weight.[4] Furthermore, the actual graft weight measured on the back table could decrease from preoperatively estimated liver volume due to several factors including dehydration caused by University of Wisconsin solution, and the difference between the virtual and actual resection line of the liver. The coefficient factor of 0.85 in non-cirrhotic liver for graft weight estimation from preoperative CT volumetry has been proposed to address these factors.[5] Although Toshima et al described the utility of GRWR in obese patients, they used actual procured graft weight for the analysis. Since graft weight could not be changed once it has been taken out from the donor, it is important to predict actual graft weight more accurately in the setting of preoperative volumetric analysis.

We believe that this article by Toshima et al would provide a compelling rationale for further investigations into comprehensive ways to estimate liver volume more accurately, potentially avoiding SFSS and improving donor shortage.

## KEYWORDS

graft volume, graft weight, living donor liver transplantation

## DISCLOSURE

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