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Deceased-donor liver size and the sex-based disparity in liver transplantation

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In deceased-donor liver transplantation, small- and large-for-size transplants are associated with elevated risk of graft loss (1). Despite this, deceased-donor liver offers are made without regard to size-matching. Additionally, the deceased donor pool is 59% male, and thus female candidates might face more size-inappropriate offers than male candidates. We aimed to characterize the relationship between the volumes of offered deceased-donor livers and the liver volume needed to treat each candidate's liver disease. Using SRTR data, we calculated estimated liver volume (eLV) for each offered and accepted liver and eLV needed for each candidate (candidate need). We used the equation developed by Johnson et al, (2) based on body surface area (BSA):

$$eLV = \left(\sqrt{0.007184 * Height(cm)^{0.725} * Weight(kg)^{0.425} * 0.72 + 0.171} \right)^3 = \left(\sqrt{BSA * 0.72 + 0.171} \right)^3.$$

Median eLV among female candidates was lower than eLV among male candidates (Figure 1, $p < 0.001$). Median eLV of livers offered to both female and male candidates was clinically similar (blue dashed lines). Median eLV of livers offered to female candidates was larger than female candidates' need ($p < 0.001$), and median eLV of livers offered to males was smaller than male candidates' need ($p < 0.001$). Women accepted livers from a narrower distribution and of a smaller eLV than that which they were offered (red dotted lines, p value < 0.001). Men accepted livers from a similar distribution to that which they were offered ($p = 0.3$). The difference between eLV of offered livers and eLV that female and male candidates require might explain disparities in liver offer acceptance (3, 4). Incorporating

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Authorship

M.G. Bowring participated in research design, data analysis, and writing the manuscript. J.M. Ruck and C.E. Haugen participated in research design and writing and editing of the manuscript. A.M. Massie, D.L. Segev, and S.E. Gentry participated in research design, data analysis, analytical support, and editing of the manuscript.

Disclosures

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size-matching in deceased-donor allocation might reduce sex disparities driven by inappropriately sized offers.

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Abbreviations

BSA	body surface area
eLV	estimated liver volume
SRTR	Scientific Registry of Transplant Recipients

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Figure 1.

Estimated liver volume (eLV) of livers that female and male candidates need to treat their end-stage liver disease, of livers offered to female and male candidates, and of livers accepted by female and male candidates; 2010–2015.