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Outcomes in LD70s Redefining the Limits of Kidney Donation: Insights From Living Donors Aged 70 Years and Older

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Kidney transplantation has been established as the standard treatment for people with advanced kidney disease, offering superior survival benefit over remaining on dialysis. Globally, significant mismatch between those awaiting transplantation and available cadaveric organs has resulted in prolonged waiting times and increased waitlist mortality that continues to escalate at an alarming rate.[1]

In an effort to overcome organ shortages and expand the donor pool, alternative options to increase living donor transplantation are now being explored. Many transplant centers are now accepting kidneys from living donors who were previously deemed unsuitable such as diabetics or individuals aged 70 years and older (LD70s). Although the process of living donation is built on the principle that it carries minimal perioperative and long-term risks, the use of organs from older donors has sparked controversy due to concerns about perceived risks of perioperative and long-term mortality and morbidity for these donors. The available literature on this subject has also been variable. Some studies suggest significantly reduced estimated glomerular filtration rate (eGFR) as well as increased risk of surgical complications to the older kidney donor themselves and report the possibility of shortened allograft survival for recipients with kidneys from such donors.[2,3] Other data have shown comparable survival outcomes among living donors and matched healthy controls.[1,4,5] As a result, knowledge about and understanding of perioperative outcomes and long-term mortality and morbidity among LD70s remains limited. This data scarcity is the reason that several transplant centers still hesitate to consider individuals aged 70 years or older as living donor candidates.

Hiramitsu and colleagues, aim to add to the limited body of work on postkidney-donation outcomes in LD70.[6] The authors retrospectively reviewed postdonation outcomes in 1226 living kidney donors (LKDs) who underwent donor nephrectomy at a single center in Japan over a 12-year period. One hundred seventy-nine of these donors were aged 70 years or older. The median postdonation follow-up was 73 months. All donors had postdonation follow-up at 1, 3, 6, and 12 months after donor nephrectomy and annually thereafter. Living donors with comorbidities were evaluated by a provider every 1 to 3 months. For the purposes of this study, the authors identified the following comorbidities to be of concern: glucose intolerance (defined as fasting glucose level $\geq$126 mg/dl, blood glucose level $\geq$200 mg/dl 2 hours after glucose administration per the 75 g oral glucose tolerance test, blood glucose level $\geq$200 mg/dl at any time, hemoglobin A1c level $\geq$6.5%, or treatment with antidiabetic agents), hypertension (defined as blood pressure $>$140/90 mm Hg or treatment with antihypertensive agents), dyslipidemia (defined as triglyceride level $>$150 mg/dl, low-density lipoprotein cholesterol level $>$140 mg/dl, high-density lipoprotein cholesterol level $<$40 mg/dl, or treatment with antihypercholesterolemic agents), and obesity (defined as body mass index $\geq$30 kg/m^2). All included LKDs were evaluated using the standard Japanese LKD selection guidelines.[7] In addition, all LKDs underwent cardiopulmonary evaluation with echocardiography, stress electrocardiography, respiratory function testing, and chest radiography; as well as age and sex (male/female) appropriate cancer screening. Kidney biopsy was performed for all LKDs 1 hour after reperfusion to assess baseline pathological findings using the Banff criteria 2018.

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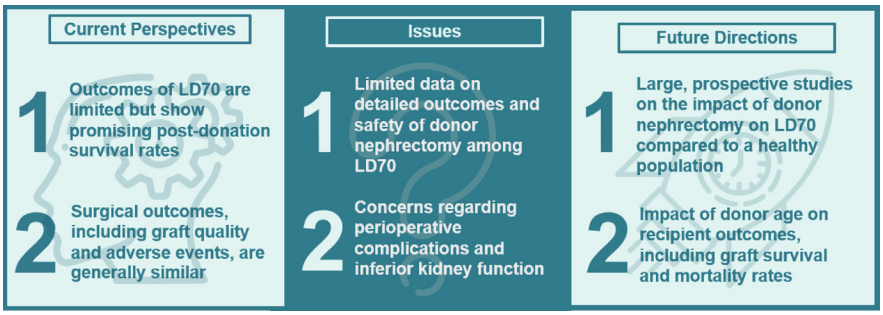

Figure 1. Current perspectives, issues, and future directions among elderly kidney donors. LD70, living donors aged 70 years and older.

The authors assessed several postdonation outcomes such as surgical outcomes, postoperative eGFR changes, end-stage renal disease (ESRD) rates, and mortality rates across the following 3 age-based cohorts: 30 to 49 years, 50 to 69 years, and 70 to 89 years. Using appropriate statistical analysis methods, the authors concluded that LD70s were more likely to have preexisting comorbidities; however, no significant differences in surgical results (such as warm ischemic time, operative time, and intraoperative blood loss), graft quality (e.g., arterial length, number of preserved arteries, venous length, number of preserved veins, ureter length, and number of preserved ureters), and adverse events (intraoperatively included arterial injury, venous injury, open conversion, bleeding, and bowel injury; postoperatively included surgical site infection, bleeding, pneumonia, urinary tract infection, small bowel obstruction, cardiovascular events, deep venous thrombosis, pulmonary embolism, and surgery-related death) were observed across the groups. LD70s had the lowest baseline eGFR in comparison to the other 2 groups; however, the reduction rate (predonation to postop day 6) of eGFR was similar across the groups in the adjusted analysis. Improvement in eGFR was significantly low among LD70s in both the unadjusted ($P = 0.009$; estimate: −0.928; 95% confidence interval: −1.624 to −0.231) and adjusted analysis ($P = 0.002$; estimate: −1.074; 95% confidence interval: −1.763 to −0.385). Kidney biopsies findings suggested that LD70s showed glomerular sclerosis most frequently. LD70s also had higher mortality rates in comparison to the other groups with 7 of the 19 observed deaths in this cohort. Malignancy was the leading cause of death among LD70s. ESRD was not observed in any of the 3 cohorts. Hiramitsu and colleagues rightly concluded that donor nephrectomy can be performed safely for LKDs aged 70 years or older without significant perioperative and ESRD risks.

As mentioned at the start of this commentary, little consensus exists in the literature with regard to the influence of advanced age on perioperative outcomes. Older donors require thorough preoperative evaluation, taking into consideration the surgical risks and risk-associated preexisting comorbidities that are inherent with aging. Hiramitsu and colleagues have successfully shown, with a fairly larger cohort of LD70s, that regardless of age, individuals with well-managed comorbidities have comparable postdonation outcomes. It is important to acknowledge that the results from this study may not be replicated in older living donors of different race, ethnicity, socioeconomic status, and geographic locations. Japan has been known as one of the world's leading countries for longevity, and increased life expectancy.[8] In contrast, the older population in United States tend to be more obese with greater prevalence of comorbidities and shorter life expectancy.[9]

There is likely an embedded selection bias wherein only a highly selective group of LD70s are deemed candidates to donate in comparison to all individuals aged 70 years and older who undergo evaluation for kidney donation. The biggest limitation to this study by Hiramitsu *et al*. is the lacking comparison of the outcomes in the LD70 cohort with an age-matched control group of community dwellers. The availability of this information, if found to be comparable among groups, would perhaps reassure the transplant community and allow for less stringent evaluation and approval process when assessing an older kidney donor candidate.

The study highlighted that the LD70 cohort experienced the lowest improvement in postoperative eGFRs. This could be explained by the higher incidence of chronic changes (such as glomerular sclerosis and interstitial fibrosis) observed and likely expected in the cohort. It is reassuring that despite this, the incidence of ESRD and mortality due to ESRD was not observed in any of the groups. In addition, one should remember that the life expectancy of individuals aged 70 years and older is significantly lower than that in the youngest age cohort. Adjusting expectations of acceptable pretransplant eGFR and eGFR recovery postdonation according to life expectancy is crucial to the expansion of living donor transplants and donor assessment practices.

Finally and though outside the scope of this study, it is important to remember the recipient and impact on allograft survival if they

were to receive kidney from an LD70. Hiramitsu and colleagues have previously explored this and showed that highest graft loss risk and mortality was only observed when living donor transplants were performed between LD70s and recipients who were also aged 70 years and older.[7]

In conclusion, this study showcases that despite modest changes in eGFR with limited improvement in eGFR after donor nephrectomy, LD70s can maintain adequate kidney function, especially when their preexisting comorbidities are effectively managed before surgery without impacting their life expectancy. Furthermore, as depicted in Figure 1, the insights gleaned from this research offer valuable perspectives and pave the way for future investigations in this age cohort. We can use this knowledge to formulate criteria to evaluate and improve organ donation from older donors, thereby expanding the kidney donor pool. These future initiatives hold promise for addressing the persistent challenge of organ shortage and ensuring better outcomes for both donors and recipients alike.

DISCLOSURE

All the authors declared no conflicting interests.

REFERENCES

1. Berger JC, Muzaale AD, James N, et al. Living kidney donors ages 70 and older: recipient and donor outcomes. *Clin J Am Soc Nephrol*. 2011;6:2887–2893. https://doi.org/10.2215/CJN.04160511
2. Minnee RC, Bemelman WA, Polle SW, et al. Older living kidney donors: surgical outcome and quality of life. *Transplantation*. 2008;86:251–256. https://doi.org/10.1097/TP.0b013e31817789dd
3. O'Brien B, Mastoridis S, Sabharwal A, Hakim N, Taube D, Papalois V. Expanding the donor pool: living donor nephrectomy in the elderly and the overweight. *Transplantation*. 2012;93:1158–1165. https://doi.org/10.1097/TP.0b013e31824ef1ae
4. Segev DL, Muzaale AD, Caffo BS, et al. Perioperative mortality and long-term survival following live kidney donation. *JAMA*. 2010;303:959–966. https://doi.org/10.1001/jama.2010.237
5. Ibrahim HN, Foley R, Tan L, et al. Long-term consequences of kidney donation. *N Engl J Med*. 2009;360:459–469. https://doi.org/10.1056/NEJMoa0804883
6. Hiramitsu T, Himeno T, Hasegawa Y, Futamura K, Okada M, Matsuoka Y, Goto N, Ichimori T, Narumi S, Takeda A, Kobayashi T, Uchida K, Watarai Y. Impact of age 70 years or older on donors for living-donor kidney transplantation. *Kidney Int Rep*. 2024;9:1321–1332.
7. Hiramitsu T, Tomosugi T, Futamura K, et al. Preoperative comorbidities and outcomes of medically complex living kidney donors. *Kidney Int Rep*. 2019;5:13–27. https://doi.org/10.1016/j.ekir.2019.10.002
8. Suzuki T, Nishita Y, Jeong S, et al. Are Japanese Older adults rejuvenating? Changes in health-related measures among older community dwellers in the last decade. *Rejuvenation Res*. 2021;24:37–48. https://doi.org/10.1089/rej.2019.2291
9. Solé-Auró A, Michaud PC, Hurd M, Crimmins E. Disease incidence and mortality among older Americans and Europeans. *Demography*. 2015;52:593–611. https://doi.org/10.1007/s13524-015-0372-7