TRANSPLANTATION

Prolonged cold ischaemic time reduces graft survival in kidneys from controlled-circulatory-death donors

Kidneys from controlled-circulatory-death donors are more susceptible to cold ischaemic injury than those from brain-death donors, according to new data from a UK cohort study published recently in *The Lancet*. However, Dominic Summers and colleagues found no evidence that kidneys from older controlled-circulatory-death donors had worse graft survival than kidneys from older brain-death donors.

In the UK, circulatory-death donors are becoming an increasingly important source of kidneys for transplantation. However, despite a serious shortage of deceased-donor kidneys, a reluctance to use kidneys from older circulatory-death donors for transplantation exists among clinicians because of concerns that these organs might be of particularly poor quality. Concerns also exist that kidneys from controlled-circulatory-death donors might be particularly susceptible to cold ischaemic injury.

In a previous study also published in *The Lancet*, Summers and colleagues found no significant difference between the graft survival of kidneys from controlled-circulatory-death ($n=739$) and brain-death donors ($n=6,759$) at 5 years post-transplantation. The aim of the present study was to determine whether kidneys from controlled-circulatory-death donors differed from those from brain-death donors in terms of the effects of donor age and length of cold-storage time on graft survival and patient mortality. “These outstanding questions from our previous work have important implications for increasing kidney donor numbers further and for devising UK organ allocation policy,” explains Summers.

Using data from the UK transplant registry, the researchers identified a cohort of more than 6,000 first-time deceased-donor kidney transplant recipients aged ≥ 18 years, who underwent renal transplantation at 23 UK adult kidney

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transplant centers between 2005 and 2010. The researchers state that this fairly recent time-frame was chosen because of the rapid change in transplantation practices that has occurred in the past few years. In total, data from 4,127 recipients of kidneys from brain-death donors and 1,768 recipients of kidneys from controlled-circulatory-death donors were included in the multivariate analysis. The median follow-up was 3.6 years.

Summers and colleagues found that the rate of delayed graft function was higher in kidneys from controlled-circulatory-death donors than in those from brain-death donors (49% versus 24%, adjusted odds ratio [OR] 3.08, 95% CI 2.60–3.65, $P<0.001$). However, at 3 years post-transplantation, there were no significant differences in graft survival (HR 1.14, 95% CI 0.95–1.36, $P=0.16$) or patient survival (HR 0.98, 95% CI 0.75–1.30, $P=0.93$) between recipients of controlled-circulatory-death and brain-death donor kidneys. Graft survival was worse in recipients of kidneys from older donors (aged >60 years) than in recipients of kidneys from younger donors (aged <40 years) but there was no significant difference in graft survival between kidneys from older controlled-circulatory-death and older brain-death donors ($P=0.3$). Based on these findings, the researchers suggest that kidneys from

older controlled-circulatory-death donors should be treated in the same way as those from older brain-death donors when making decisions on whether to use the organ for transplantation.

The median cold and warm ischaemic times of kidneys from controlled-circulatory-death donors were 14 h and 14 min, respectively, whereas kidneys from brain-death donors had a slightly longer median cold ischaemic time (16.4 h) and no recorded warm ischaemic time. Duration of cold storage did not affect graft survival in kidneys from brain-death donors; however prolonged cold ischaemic time (>24 h versus <12 h) was associated with worse graft survival in controlled-circulatory-death donor kidneys (HR 2.36, 95% CI 1.39–4.02, $P=0.004$).

Summers believes these data are likely to have important implications for the design of the new UK national organ allocation algorithm for circulatory-death donor kidneys. “The algorithm currently under consideration would allocate circulatory-death donor kidneys within a limited geographical zone to reduce shipping times,” he explains. “This strategy would minimize the exposure of the organs to cold ischaemia.” In addition, he hopes that the new findings will reassure clinicians that kidneys from older controlled-circulatory-death donors are acceptable for transplantation. According to Summers, this reassurance could lead to a further increase in the utilization of such organs and, therefore, to a resulting increase in the total number of kidney transplantations carried out in the UK.

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Original article Summers, D. M. *et al.* Effect of donor age and cold storage time on outcome in recipients of kidneys donated after circulatory death in the UK: a cohort study. *Lancet* doi:10.1016/S0140-6736(12)61685-7

Further reading Summers, D. M. *et al.* Analysis of factors that affect outcome after transplantation of kidneys donated after cardiac death in the UK: a cohort study. *Lancet* 376, 1303–1311 (2010)