



Is ABO Incompatible Living Donor Kidney Transplantation in Children a Better Option than the Use of Optimal Grafts From Deceased Donors? A Plea for Better Prioritization of Deceased Kidney Grafts for Children

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While we acknowledge that ABOi LDKTx can be successfully performed in children and has the advantage of reducing the waiting time and risks associated with prolonged dialysis whilst conferring the benefits of living donor transplantation [1], we would like to balance the conclusions made by the authors and outline valuable alternatives.

ABOi kidney transplantation carries a higher risk of rejection compared to ABO compatible transplantation, most particularly antibody-mediated rejection [2]. To overcome this, both extensive pre-transplant conditioning and additional pre-transplant immunosuppressive therapy are required and include desensitization techniques such as antigen-specific immunoadsorption, B cell-depleting monoclonal antibodies (mainly rituximab), and intensified immunosuppression protocols. Such complex treatments expose children to a higher risk of bacterial and viral infections [2], post-transplant lymphoproliferative disease, and other neoplasias. Apheresis techniques require central venous lines in the absence of an arteriovenous fistula, especially in children on peritoneal dialysis or with pre-emptive transplantation, and these procedures can be complicated by infection, thrombosis, or bleeding, and so jeopardize future access to dialysis. In addition, these techniques may be impractical or risky in young children due to the extracorporeal volume required during immunoadsorption sessions. ABO incompatible kidney transplantation is therefore rarely performed in children who weigh <20 kg.

From an economic standpoint, ABOi transplantation is more expensive and resource intensive than ABO compatible transplantation. Additional procedures, prolonged hospital stays, and specialized therapies required for desensitization significantly increase the overall cost of the transplant procedure. For this reason, it may not be available in every health framework. On the other hand, shorter dialysis times obviously spare costs. Moreover, living organ donation can have a financial impact on the donor and his or her family, depending on specific national policies and social security requirements.

Additionally, some parents may want to reserve the option of donating their kidney for a second transplant in adulthood, at an age when organ shortages can be even greater.

Furthermore, while transplants from living donors generally have a better prognosis than transplants from deceased donors, it should be noted that parents who are candidates for donation are increasingly older and have more co-morbidities [3], whereas children often receive transplants from young deceased donors whose parenchyma is generally well preserved at the time of donation. This may partly reduce the advantages of living donation in pediatric kidney transplantation.

We would therefore like to discuss alternatives to ABOi LDKTx in children.

Firstly, we call for better prioritization of the allocation of deceased donor kidney transplants in children who will eventually require several transplants over the course of a lifetime. Priority rules should include age-matching criteria that could guarantee prioritization of pediatric recipients for optimal transplants with shorter waiting times. The allocation policies for transplants vary between jurisdictions and healthcare systems. In France, for instance, absolute national priority is given to recipients under the age of 18 years for the two kidneys of any donor under the age of 18 [4]. Pediatric recipients are also given priority for one of the kidney transplants from donors aged between 18 and 29, in the absence of a recipient benefiting from a priority due to immunization or a multi-organ transplant. Pediatric priority is extended until the transplant if the candidate was under 18 at the start of dialysis. Similarly, in the United States, recipients younger than 18 have priority over donors under 35 years of age [5]. Spain, Italy, and Switzerland also have strong pediatric prioritization with short waiting times. However, this priority is more limited elsewhere, particularly in the Euro Transplant zone (comprising Holland, Belgium, Luxembourg, Germany, Austria, Croatia, and Slovenia) where it should be improved, as it is currently restricted to kidneys from donors aged under 18, who are allocated as a priority to recipients who are also younger than 18. The impact on waiting times for adults based on better pediatric prioritization would be very small because of the large difference in numbers on waiting lists. Moreover, the prioritization criteria would be regularly evaluated and refined to ensure equity, fairness, and transparency.

We agree with the authors that paired kidney exchange programs, also known as kidney swaps or paired donation, such as that in the United States, can be a good strategy for children. We are pleased to note that such a program has been initiated in the United Kingdom, and we hope that this will also be the case for other pediatric kidney transplant programs. Altruistic donation to children could also be allowed. We find it extremely difficult to understand

why there is still so much political reluctance, particularly in countries like Germany and France.

Finally, the use of infant kidneys transplanted *en-bloc* in specialized centers may be an interesting alternative for reducing the waiting time for children on the list. Various series have shown good results with this strategy in specialized teams [6–9]. One retrospective study, for example, compared 72 children who had received an *en-bloc* kidney with 75 who had received a kidney from a living donor. The estimated glomerular filtration rate was significantly higher in children who had received an *en-bloc* kidney from the 5th to the 17th year after transplantation and the 25 years graft survival was similar in both groups [10]. Another option is the split of infant *en-bloc* kidneys and the allocation to two small pediatric recipients. This approach has been successful in specialized centers [11], and further increases the number of recipients.

Also of note, pediatric organ donation, which decreased significantly during the COVID-19 pandemic, as was also the case with adults, should be an absolute priority, and the rate of organ donation refusals must be reduced [12].

To conclude, it is essential to consider the advantages and disadvantages outlined above in the context of each child's specific medical condition and individual circumstances. The decision to pursue ABOi LDKTx should be made in consultation with the child's medical team, weighing the potential benefits against the associated risks. Regardless, pediatric organ donation must be promoted, and priority given to optimal kidneys for pediatric recipients, who will often undergo several kidney transplants in the course of their lives. This is described in detail in the position statement of the International Pediatric Transplant Association [13], which emphasizes the special obligations society has towards children, the fair innings argument, and cumulative and time-sensitive accrual of developmental morbidity.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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