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Expanding the Organ Donor Pool: Using En Bloc Kidneys in Pediatric Recipients

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Introduction

The demand for renal allografts has so far outstripped the available organ donor pool that the gap between patients awaiting a transplant and those actually receiving a transplant seems to be forever widening. Renal transplantation is the ultimate treatment of choice for patients with end stage renal disease as it offers better long term survival and quality of life compared to dialysis [1]. Children with end stage renal disease are especially vulnerable to the organ shortage, since their psychosocial and neurodevelopmental functioning is adversely affected by the uremic environment and any delay in transplanting them can have long term ramifications. Moreover, pre-emptive transplantation has been shown to improve long term graft survival in children [2] . These considerations have made it critical for health-care providers to minimize wait times on dialysis. Among other strategies, expanding the deceased donor organ pool by using organs from donors previously thought of as unsuitable, has proven to be a successful strategy.

En Bloc Renal Transplantation is a Viable and Safe Option to Reduce Wait Times

Retrieval of kidneys from young donors for transplantation, either as single kidneys or in an 'en bloc' manner, allows utilization of allografts that were previously abandoned and wasted. While the transplantation of pediatric donor kidneys, especially from donors less than 5 years old, is still limited to a few specialized centers, the practice seems to be increasing as evidence of the successes of this strategy grows [3-7].

Recent reports from various centers have consistently demonstrated a positive experience using en bloc kidneys in pediatric and adult recipients. The graft survival of en bloc kidneys has been at least comparable to standard deceased donor kidneys [4,8-12]. Some studies in fact have shown superior outcomes with en bloc transplants compared to standard deceased donor and even live donor transplants [13-15]. In a recent study from France, researchers compared the graft survival among recipients of en bloc grafts (mean donor age of 15 months) to those receiving standard donor grafts (mean donor age of 38 years); those who received en bloc kidneys fared better than their counterparts, with a 10 year survival of 74% compared to 58% [14]. The benefits of superior survival of en bloc grafts over the long haul is especially salient in pediatric patients, as they have a longer life expectancy and hence have more to gain from maximizing graft survival [16].

Advantages of En Bloc over Solitary Grafts from Young or Ideal Donors

Kidneys from small donors have largely been avoided by the transplant community because of the low nephron mass and a higher risk of vascular complications. Reduce nephron mass renders the graft more prone to early hyper-filtration injury; en bloc grafts with twice the number of nephrons and higher volume may mitigate this risk [17,18]. Based on animal studies and experience from clinical settings, en bloc grafts but not ideal single kidney donor grafts, increase in size rapidly to adapt to the host environment [5,15,19-21].

In recipients of pediatric donors kidneys, the absolute Glomerular Filtration Rate (GFR) rose along with patient growth, and higher GFRs were sustained when compared to recipients of adult donor kidneys [22,23]. These observations support the use of young donor kidneys into pediatric as opposed to adult recipients since pediatric grafts are better able to acclimatise to the needs of growing children. Although still somewhat contentious, reports, including one using the United Network of Organ Sharing (UNOS) database, suggest an advantage of using of en bloc over single kidneys from young donors [4,24-26].

While early reports of increased vascular complications with en bloc transplantation were discouraging [27-30], recent reports have shown more encouraging outcomes [5,11,26,31]. This is likely due to increased experience and improvements in surgical techniques over time, which should help further reduce the skepticism in using young donors for transplantation.

Since follow-up remains relatively limited, many questions still remain unanswered. Chief among these are the sustained ability of en bloc kidneys to maintain GFR and the potential risk of hyperfiltration injury leading to graft loss.

Conclusions

A growing experience from various transplant centers has demonstrated excellent graft survival of en bloc renal transplants in both children and adults. En bloc transplantation offers the advantages of greater nephron mass compared to solitary allografts and rapid growth in size to match recipient growth. Although this is still a technically demanding procedure and has been performed mostly in experienced transplant centers, recent success should increase the willingness of other centers to follow suit.

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