1. DONACIÓN EN ASISTOLIA CONTROLADA EN DONACIÓN PEDIÁTRICA

1. Pediatric Liver and Kidney Transplantation With Allografts From DCD Donors: A Review of UNOS Data

Abt P, Kashyap R, Orloff M et al.
Transplantation 2006;82: 1708–1711.

ABSTRACT
INTRODUCTION: Donation after cardiac death (DCD) is recognized as an important source of allografts to bridge the growing disequilibrium between the number of donors and recipients. Current transplant experience with DCD organs has focused on the adult recipient population, however little is known about the pediatric recipient experience. While there is increasing acceptance of these grafts in adults, transplant centers appear reluctant to use these grafts in the pediatric population.
METHODS: We reviewed the United Network for Organ Sharing database from 1995–2005 to determine the national experience with pediatric recipients of DCD organs.
RESULTS: Among 4026 renal transplants performed in children 18 years and younger, 26 (0.6%) received a renal allograft from a DCD donor. Ten (38.5%) received kidney allografts from pediatric donors (age≤18) and 16 (61.5%) from adult donors (age>18 years). Graft survival at one and five years was 82.5%, 74.3% for kidneys from DCD donors compared to 89.6%, 64.8% from brain dead donors (DBD) (P=0.7). Among 4991 liver transplants, 19 (0.4%) were from DCD donors. Sixteen patients (84.2%) received livers from pediatric donors and three (15.8%) from adult donors. Graft survival at one and five years was 89.2%, 79.3% for livers from DCD, compared to 75.6%, 65.8% for DBD (P=0.3).
CONCLUSION: The use of DCD donors in the pediatric population is very limited; however graft survival is comparable to DBD grafts. Although pediatric centers may have been reluctant to utilize this donor source, this limited experience demonstrates that the select use of DCD organs can produce acceptable and durable graft survival in the pediatric population.

2. Late Graft Loss among Pediatric Recipients of DCD Kidneys

Van Arendonk KJ, James NT, Locke JE et al.
Clin J Am Soc Nephrol 6: 2705–2711, 2011.

ABSTRACT
BACKGROUND AND OBJECTIVES: Kidney transplantation from donors after cardiac death (DCD) provides similar graft survival to donors after brain death (DBD) in adult recipients. However, outcomes of DCD kidneys in pediatric recipients remain unclear, primarily because of limited sample sizes.
DESIGN, SETTING, PARTICIPANTS, & MEASUREMENTS: We identified 137 pediatric (<18 years old) recipients of DCD kidneys between 1994 and 2010 using Scientific Registry of Transplant recipients data and compared outcomes with 6059 pediatric recipients of DBD kidneys during the same time period, accounting for donor, recipient, and transplant characteristics using time-varying Cox regression and matched controls. Long-term follow-up (4 years or beyond) was available for 31 DCD recipients.
RESULTS: Pediatric recipients of DCD kidneys experienced a significantly higher rate of delayed graft function (22.0% *versus* 12.3%; *P* = 0.001), although lower than reported delayed graft

function rates of DCD grafts in adults. Although DCD and DBD graft survival was equal in the early postoperative period, graft loss among pediatric recipients of DCD kidneys exceeded their DBD counterparts starting 4 years after transplantation. This effect was statistically significant in a multivariate Cox model (hazard ratio = 2.03; 95% confidence interval, 1.21 to 3.39; *P* =0.007) and matched-controls analysis (hazard ratio = 2.36; 95% confidence interval, 1.11 to 5.03; *P* = 0.03).
CONCLUSIONS: A significant increase in DCD graft loss starting 4 years after transplantation motivates a cautious approach to the use of DCD kidneys in children, in whom long-term graft survival is of utmost importance.

3. Donation after cardiac death in pediatric organ transplantation
Yoo PS, Olthoff KM, Abt PL.
Curr Opin Organ Transplant. 2011, 16:483–488.

ABSTRACT
PURPOSE OF REVIEW: The purpose of this review is to describe the history, current practice, and outcomes of the transplantation of organs donated after cardiac death (DCD) in children.
RECENT FINDINGS: The rate of death on the waiting list is greater for children under 5 years of age than for any other age group. The organ shortage experienced by the general population awaiting transplantation is made more complex due to the need for size-appropriate organs for transplantation into small children. Pediatric DCD organ recovery has been proposed as a means of ameliorating this shortage.
SUMMARY:
The use of DCD organs has experienced resurgence in the past 15 years, and a growing body of literature supports their use in selected cases. Recent experience in pediatric transplantation using DCD heart, lung, liver, and kidney is reviewed.

4. Kidney donation from children after cardiac death
de Vries EE, Snoeijs MG, van Heurn E
Crit Care Med 2010 Vol. 38, No. 1.

ABSTRACT
OBJECTIVE: Pediatric kidney donation after cardiac death is an underutilized donor source because of ethical concerns and limited knowledge of the outcome after transplantation. The purpose of this study was to report the Dutch experience of kidney transplantation using pediatric donation after cardiac death.
DESIGN: Observational cohort study of a series of consecutive kidney transplantations from pediatric donation after cardiac death from January 1995 to July 2006.
SETTING: Kidneys were procured in seven Dutch procurement areas.
PATIENTS: Recipients of kidneys from donors after cardiac death aged 2 to 17 yrs.
MEASUREMENTS AND MAIN RESULTS: Prospectively collected data from the Dutch Organ Transplant Registry were analyzed. Donor, graft, and recipient characteristics of all pediatric donations after cardiac death kidney transplantations were documented. Recipients were followed-up for glomerular filtration rate, graft, and patient survival. Eighty-eight patients were transplanted with 90 pediatric donation-after-cardiac-death kidneys, which was 31% of the total number of transplanted pediatric donor kidneys. In 77% of recipients, organs were procured from

controlled donors, after withdrawal of supportive treatment. Of all donors, 9% were younger than age 6 yrs. Two patients received their graft preemptively. In the others, the incidence of immediate function, delayed graft function, and primary nonfunction were 49%, 44%, and 7%, respectively. Warm ischemia time > or =25 mins was associated with primary nonfunction. Overall graft and patient survival 5 yrs after transplantation were 80% and 88%, respectively. Graft survival after immediate function and delayed graft function was not different.
CONCLUSIONS: Kidneys from pediatric donation after cardiac death are suitable for transplantation and may substantially expand the donor pool with good transplant outcome.

5. Kidney donation after circulatory death: current evidence and opportunities for pediatric recipients

Marlais M, Callaghan C, Marks SD.
Pediatr Nephrol (2016) 31:1039–1045.

ABSTRACT
Organ donation after circulatory death (DCD) has experienced a revival worldwide over the past 20 years, and is now widely practiced for kidney transplantation. Some previous concerns about these organs such as the high incidence of delayed graft function have been alleviated through evidence from adult studies. There are now a number of large adult cohorts reporting favorable 5-year outcomes for DCD kidney transplants, comparable to kidneys donated after brain death (DBD). This has resulted in a marked increase in the use of DCD kidneys for adult recipients in some countries and an increase in the overall number of kidney transplants. In contrast, the uptake of DCD kidneys for pediatric recipients is still low and concerns still exist over the longer-term outcomes of DCD organs. In view of the data from adult practice and the poor outcomes for children who stay on dialysis, DCD kidney transplantation should be offered as an option for children on the kidney transplant waiting list.

6. Pediatric Deceased Donation—A Report of the Transplantation Society Meeting in Geneva

Martin DE, Nakagawa TA, Siebelink MJ, et al.
Transplantation 2015;99: 1403–1409.

ABSTRACT
The Ethics Committee of The Transplantation Society convened a meeting on pediatric deceased donation of organs in Geneva, Switzerland, on March 21 to 22, 2014. Thirty-four participants from Africa, Asia, the Middle East, Oceania, Europe, and North and South America explored the practical and ethical issues pertaining to pediatric deceased donation and developed recommendations for policy and practice. Their expertise was inclusive of pediatric intensive care, interna lmedicine, and surgery, nursing, ethics, organ donation and procurement, psychology, law, and sociology. The report of the meeting advocates the routine provision of opportunities for deceased donation by pediatric patients and conveys an international call for the development of evidence based resources needed to inform provision of best practice care in deceased donation for neonates and children.

7. Non-standard criteria donors in pediatric kidney transplantation

Pereira LDNG, Nogueira PCK.

Pediatric Transplantation. 2019;00:e13452.

ABSTRACT

KT remains the treatment of choice for ESRD in children. However, the demand for kidney transplants continues to outstrip supply, even in the pediatric scenario. We reviewed the applicability of nonSCDs for pediatric KT. There is a lack of studies analyzing this modality among pediatric donors and recipients, where most conclusions are based on predictions from adult data. Nevertheless, marginal donors might be a reasonable option in selected cases. For example, the use of older LDs is an acceptable option, with outcomes comparable to SCDs. Organs donated after cardiac death represent another possibility, albeit with logistic, ethical, and legal limitations in some countries. AKI donors also constitute an option in special situations, although there are no pediatric data on these transplants. Likewise, there are no data on the use of expanded criteria donors in pediatric patients, but this appears not to be a good option, considering the compromised long-term survival.

8. UK National Registry Study of Kidney Donation After Circulatory Death for Pediatric Recipients

Marlais M, Pankhurst L, Hudson A et al.

Transplantation 2017;101: 1177–1181.

ABSTRACT

BACKGROUND: Donation after circulatory death (DCD) kidney transplantation has acceptable renal allograft survival in adults but there are few data in pediatric recipients. The aim of this study was to determine renal allograft outcomes for pediatric recipients of a DCD kidney.

METHODS: Data were collected from the UK Transplant Registry held by National Health Service Blood and Transplant. Kidney transplants performed for pediatric recipients (age, <18 years) in the United Kingdom from 2000 to 2014 were separated into DCD, donation after brain death (DBD), and living donor (LD) transplants, analyzing 3-year patient and renal allograft survival.

RESULTS: One thousand seven hundred seventy-two kidney only transplants were analyzed. Twenty-one (1.2%) of these were from DCD donors, 955 (53.9%) from DBD donors, and 796 (44.9%) from LDs. Patient survival is 100% in the DCD group, 98.7% in the DBD group, and 98.9% in the LD group. Three-year renal allograft survival was 95.2% in the DCD group, 87.1% in the DBD group, and 92.9% in the LD group. There was no significant difference in 3-year renal allograft survival between the DCD and DBD groups (P = 0.42) or DCD and LD groups (P = 0.84). For DCD, the primary nonfunction rate was 5% and delayed graft function was 25%.

CONCLUSIONS: Children receiving a DCD kidney transplant have good renal allograft survival at 3-year follow-up, comparable to those receiving a kidney from a DBD donor or a LD. This limited evidence encourages the use of selected DCD kidneys in pediatric transplantation, and DCD allocation algorithms may need to be reviewed in view of this.

2. DONANTE PEQUEÑO

9. Utilisation of small paediatric donor kidneys for transplantation.

Damji S, Callaghan CJ, Loukopoulos I et al.
Pediatr Nephrol. 2018 Sep 20.

ABSTRACT
With the increasing need for kidney transplantation in the paediatric population and changing donor demographics, children without a living donor option will potentially be offered an adult deceased donor transplant of marginal quality. Given the importance of long-term graft survival for paediatric recipients, consideration is now being given to kidneys from small paediatric donors (SPDs). There exist a lack of consensus and a reluctance amongst some centres in transplanting SPDs due to high surgical complication rates, graft loss and concerns regarding low nephron mass and long-term function. The aim of this review is to examine and present the evidence base regarding the transplantation of these organs. The literature in both the paediatric and adult renal transplant fields, as well as recent relevant conference proceedings, is reviewed. We discuss the surgical techniques, long-term graft function and rates of complications following transplantation of SPDs. We compare graft survival of SPDs to adult deceased donors and consider the use of small paediatric donors after circulatory death (DCD) organs. In conclusion, evidence is presented that may refute historically held paradigms regarding the transplantation of SPDs in paediatric recipients, thereby potentially allowing significant expansion of the donor pool.

10. Expanding the Envelope: Favorable Outcomes Utilizing Kidneys From Small Pediatric Donors (≤ 15 kg).

Fayek SA, Ali MS, Hasham L et al.
Transplant Proc. 2018 Dec;50(10):3204-3210.

ABSTRACT
BACKGROUND: Utilization of kidneys from small pediatric donors (SPDs ≤ 15 kg) is limited. Decisions to split and use the kidneys for 2 recipients remain controversial.
METHODS: Retrospective single-center study aimed primarily at evaluating graft loss within 30 days after transplant using SPD kidneys. Recipients were divided into group A (donor weight < 10 kg, n = 24) and group B (≥ 10 kg, n = 16).
RESULTS: Forty transplants were performed with 100% patient survival. Mean follow-up was 402 days, overall graft survival was 95%, with 91.7% and 100% in groups A and B, respectively (P = .24). Mean recipient-to-donor weight ratio (RTDWR) was higher in group A (10.5 vs 6.3, P < .001). Surgical complications were similar between the groups. These were more common with en bloc compared to single implantation (P = .05), and RTDWR was the main predictor (P = .005). Graft function was similar between the groups; mean 12-month creatinine was 1.2 mg % and eGFR was 58.2 mL/min/1.73 m2. Sixteen out of 38 patients developed proteinuria (42%) with no difference among subgroups, although male recipients were at a higher risk (OR = 8.4 [95% CI 1.5-46.1], P = .014); 83% responded to therapy.
CONCLUSION: Utilization and early splitting of SPD kidneys yields favorable graft survival and function irrespective of donor weight and age. Early splitting should be considered.

11. Kidney grafts from donors ≤ 5 yr of age: Single kidney transplantation for pediatric recipients or en bloc transplantation for adults?

Gander R, Asensio M, Molino JA et al.

Pediatr Transplant. 2013 Mar;17(2):179-84

ABSTRACT

Kidneys from donors ≤5 yr of age represent a controversial issue. The purpose of this study was to compare the transplant outcomes as single and single/en bloc grafts into pediatric and adult KT recipients, respectively. All recipients of kidneys from donors ≤5 yr old transplanted at our institution from 3/2003 to 12/2010 were evaluated, and corresponding data were analyzed. There were 11 pediatric and 14 adult recipients. Median donor age and body weight were 38 months and 14 kg, respectively. PNF, n = 2 and DGF, n = 1 were observed only among adult recipients. Five-yr graft survival was 100% for children and 86% for adults. There were no significant differences in graft and patient survival, PNF, DGF, acute rejection, or postoperative complications among children/single (n = 10), adults/en bloc (n = 10), and adults/single (n = 4) KT. Major complications were documented in six adult recipients and one pediatric recipient after en bloc KT. Pediatric recipients showed significantly higher GFR during the first post-transplant year. Kidneys from donors ≤5 yr of age have at least as good outcomes as when transplanted as single allografts into children. Although the study-volume is small, it seems that children benefit from a pediatric-oriented allocation policy.

12. Is donor age 6 years or less related to increased risk of surgical complications in pediatric kidney transplantation?

Gallinat A, Sotiropoulos GC, Witzke O et al.

J Pediatr Urol. 2018 Oct;14(5):442.e1-442.e8.

ABSTRACT

INTRODUCTION: Despite the widespread organ shortage dilemma, there is hesitancy regarding utilization of young donors (aged ≤6 years) because previous reports have suggested that this is associated with an increased risk of surgical complications and graft loss.

OBJECTIVE: The aim of this study was to determine if donor age ≤6 years is related to increased risk of surgical complications or allograft loss in pediatric kidney transplantation (KT).

STUDY DESIGN: A retrospective study of pediatric kidney transplants (KT) undertaken between January 2000 and July 2015. The incidence of surgical and urological complications, and allograft loss were analyzed and compared between donors aged ≤6 years (Group 1) and donors aged >6 years (Group 2).

RESULTS: A total of 171 pediatric KTs were performed at the current center during the study period. Twenty-eight patients were excluded; as a result, the study comprised 143 patients: 60 (Group 1) and 83 (Group 2). Mean recipient weight was 17 kg (SD 9.7; range 3.2-47) in Group 1 and 38.2 kg (SD 15.3; range 7.8-73) in Group 2. Despite a significantly higher proportion of risk factors in Group 1, no significant between-group differences were observed in terms of: surgical complications (OR 0.4; range 0.1-1.2), early urological complications (OR 2.2; range 0.4-11), late urological complications (OR 0.3; range 0.8-1.4), lymphoceles (OR 6.2; range 0.7-51.7) and allograft loss (OR 1.5; range 0.7-3.1, summary Table). Graft survival at 1 and 5 years was: 81% and 70% (Group 1) and 92% and 79% (Group 2), respectively (P = 0.093). Mean follow-up was 90.13 ± 49.7 months.

DISCUSSION: The main finding of this retrospective study was that pediatric donor kidneys from donors aged ≤6 years could safely be used in pediatric recipients without an increased risk of surgical and urological complications or graft loss. Nevertheless, KT with small donor kidneys is challenging and should be performed at experienced pediatric centers.
CONCLUSION: In line with these results, the outcomes of KT using donors aged ≤6 years were encouraging and similar to those obtained with older donors. Thus, this study supported using kidney grafts from young donors, given the organ shortage and potential high mortality risk while awaiting KT.

13. Outcome of kidney transplantation from young pediatric donors (aged less than 6 years) to young size-matched recipients
Gander R, Asensio M, Molino JA et al.
J Pediatr Urol. 2019 May;15(3):213-220

ABSTRACT
INTRODUCTION: Pediatric donation is underutilized because of presumed increased risk of vascular thrombosis (VT) and graft loss. Using young pediatric donors (YPDs) for young pediatric recipients (YPRs) is suggested to be even at greater risk and therefore precluded in many centers. The aim of this study was to analyze the outcome of kidney transplantation (KT) from YPD to age-matched YPR.
PATIENT AND METHODS: A retrospective study of 118 pediatric KT performed between January 2007-July 2017. The authors identified KT with YPD (considered as those aged <6 years) and age-matched YPR. Organ allocation was performed based on the best paired size (YPR for YPR). Data were collected regarding donor and recipient characteristics, surgical and urological complications, graft loss, and outcomes.
RESULTS: Forty cases of YPD to age-matched YPR were identified (33.89% of the cohort). Mean recipient and donor age were 2.9 years(SD 1.68) and 2.24 years (SD 1.5), respectively. Mean recipient and donor weight were 12.7 kg (SD 4.1) and 13.7 kg (SD 4.15), respectively. Thirty of those young recipients (75%) weighed <15 kg. The most frequent primary renal disease was the congenital nephrotic syndrome. Nine out of 40 patients (22.5%) had received a previous KT before. Three received a combined liver-KT. Eight (20%) were classified as high immunological risk and 19 (47.5%) as high thrombotic risk. All allografts were implanted extraperitoneally and anastomosed to the iliac vessels. Major complications requiring reintervention occurred in seven patients (17.5%): three VT, three bleeding episodes, and one ureteral necrosis. Remarkably, only one surgical complication (VT) resulted in graft loss. Regarding long-term urological complications, four patients (10%) all with obstructive uropathy-developed vesicoureteral reflux to the graft. Actuarial graft survival at 1,5, and 10 years in the YPD to age-matched YPR cohort was 83% -78% -78%, respectively. Mean follow-up was 3.6 years (SD 3.2) (r = 7-10). Over time, eight patients lost their graft, not related to surgical factors in seven out of eight cases.
CONCLUSION: The authors suggest that KT using YPD for age-match YPR yields good results in expert centers, even in high-risk patients and is associated with good graft survival. In this series, surgical complications were rarely related to graft loss.

14. Single Kidney Transplantation from Young Pediatric Donors in the United States

Kayler LK, Magliocca J, Kim RD et al.

Am J Transplant. 2009 Dec;9(12):2745-51

ABSTRACT

Kidney transplantation (KTX) from small pediatric donors is performed as single or en bloc. Criteria to determine when to split pediatric donor kidneys and transplant as singles are not well established. Data reported to the Scientific Registry of Transplant Recipient for donors <10 yrs from 1995 to 2007 were reviewed (n = 5079). Donors were categorized by weight group by 5 kg increments and solitary (n = 3503) versus en bloc (n = 1576). The primary outcome was overall graft survival. Results were compared as adjusted hazard ratios (aHR) relative to ideal standard criteria donors (SCDs) (defined as age 18-39 without other risk factors), non-ideal SCDs (all other SCDs) and expanded criteria donors (age 50-59 with other risk factors or age >or=60). Single KTX from donors >or= 35 kg conferred a similar risk of graft survival as ideal SCDs. Of donors 10-34 kg, risks of en bloc KTX were similar to ideal and risks of single KTX to non-ideal SCDs; single and en bloc KTXs had 7.9 and 5.2 graft losses per 100 follow-up years, respectively. Single KTX from donors >35 kg are similar to ideal SCDs. Single KTX from donors 10-35 kg are similar to non-ideal SCDs. From a resource perspective, pediatric donors 10-35 kg used as singles offer more cumulative graft years than when used en bloc.

15. Kidney Transplantation From Small Pediatric Donors: Does Recipient Body Mass Index Matter?

Kayler LK, Zendejas I, Gregg A et al.

Transplantation. 2012 Feb 27;93(4):430-6

ABSTRACT

BACKGROUND: The influence of recipient body mass index (BMI) on pediatric-donor kidney transplant outcomes is unclear. We aimed to determine graft survival and functional outcomes of pediatric-donor kidneys compared with adult kidneys stratified by recipient BMI group.

METHODS: Scientific Registry of Transplant Recipients data for recipients from 1996 to 2010 were reviewed. Donors were categorized by transplant type, pediatric single kidney transplant (SKT, n=3712), en bloc kidney transplant (EBK, n=1517), or adult standard criteria donor (SCD, n=66,741). Recipients were stratified by BMI tertiles (<24, 24-29, and >29 kg/m).

RESULTS: SKT and EBK from donors ≤40 kg conferred similar risks of adjusted death-censored graft survival relative to SCDs regardless of recipient BMI except for EBK transplants in recipients with BMI <24 where the effect was protective (adjusted hazard ratio [aHR] 0.71, 95% confidence interval [CI] 0.56-0.94). SKT from donors ≤20 kg conferred worse death-censored graft survival in recipients with BMI <24 (aHR 1.3, 95% CI 1.0-1.6) and BMI >29 (aHR 1.5, 95% CI 1.1-2.0); however, most of the risk appeared early, and the effect was abrogated with reanalysis conditional on 1-year graft survival. Compared with SCDs, 1-year glomerular filtration rates of SKT from donors ≤20 kg were significantly higher when transplanted into recipients with BMI <24 (P<0.01) and similar in the other BMI groups.

CONCLUSION: Increasing recipient BMI is not a clear risk factor for outcomes or graft function after transplantation with small pediatric-donor kidneys.

16. Utilization of Small Pediatric Donor Kidneys: A Decision Analysis

Laurence JM, Sandroussi C, Lam VW et al.

Transplantation. 2011 May 27;91(10):1110-3.

ABSTRACT

BACKGROUND: Given the disparity between static supply and increasing demand for organs, the greatest challenge is broadening access to the benefits of kidney transplantation. Organs from small deceased pediatric donors are a potentially underused resource. These may be transplanted as en bloc kidney transplants (EBKTs) to one recipient or as single kidney transplants (SKTs) to two recipients, albeit with an increased risk of graft failure.

METHODS: A systematic literature search identified data on transplant outcomes for recipients of organs from small pediatric deceased donors. A decision analysis model was constructed to allow the outcome in life years (LY) to be predicted for patients with end-stage kidney disease on the transplant waiting list depending on whether they received EBKT or SKT.

RESULTS: At all recipient ages, the projected LY of both recipients of an SKT was greater than the projected LY of an EBKT recipient. The net estimated gain in LY associated with the SKT technique was greatest for recipients aged 20 to 39 years (14.3 years) and lowest for recipients aged 60 to 74 years (3.36 years). Only for recipients of organs from donors weighing less than 10 kg, there was an estimated net loss of LY associated with the SKT technique across all recipient age groups.

CONCLUSIONS: There is a greater gain in overall life expectancy using SKTs, because this technique yields two recipients per donor, which more than compensates for the increased risk of graft failure.

17. Growth of pediatric recipients after renal transplantation from small pediatric deceased donors weighing less than 15 kg

Liu Z1, Zhao WY1, Zhang L et al.

Pediatr Transplant. 2019 Feb;23(1):e13306.

ABSTRACT

RTx is currently the best treatment for children with ESRD. This study retrospectively analyzed the outcomes of growth after RTx using the pediatric-to-pediatric allocation strategy and some factors that may affect it. From March 2012 to August 2016, 8 en bloc and 38 single pediatric RTxs were performed at our center using organs from small pediatric deceased donors (weight < 15 kg). Growth before and afterRTx was analyzed according to the height-for-age z-score at RTx, the 3-year follow-up, and adulthood and compared between the procedures. The chi-square test and multiple linear regression analysis were used for statistical analyses. Overall, 79.2% of children were diagnosed with chronic nephritis before RTx; 14.6% of cases were due to congenital urinary tract malformation, and 6.3% of cases were due to unknown causes. All grafts and patients survived postoperatively. The mean estimated GFRs were 92.7 ± 28.6 mL/min/1.73 m^2 , 100.9 ± 32.3 mL/min/1.73 m^2 , and 110.1 ± 34.8 mL/min/1.73 m^2 at 1, 2, and 3 years' postoperatively, respectively. The children's postoperative growth and development, particularly during the first year postoperatively, improved but were negatively correlated with age and the height-for-age z-score before RTx. The growth of children after RTx was moderate and accelerated during prepubescence. The rate of post-RTx growth during the first year postoperatively was unrelated to the recipient's sex or duration of dialysis ($P > 0.05$) but was negatively correlated with age at RTx ($r = -0.349$, $P = 0.043$). Future studies on the long-term outcomes are still needed.

18. Optimizing Recovery, Utilization and Transplantation Outcomes for Kidneys From Small, ≤20 kg, Pediatric Donors

Maluf DG, Carrico RJ, Rosendale JD et al.

Am J Transplant. 2013 Oct;13(10):2703-12.

ABSTRACT

The optimal balance between maximizing the number versus the outcome of transplantation utilizing kidneys from small (≤20 kg) pediatric donors remains unclear, complicated by the choice of single versus en bloc transplantation with their attendant technical risks. Using the Organ Procurement and Transplantation Network (OPTN) database, we examined kidney recovery and utilization patterns, and 1-year transplant outcomes by single kilogram weight strata. Between January 1, 2005 and June 30, 2010, 2352 kidneys from ≤20 kg donors were transplanted into 1531 recipients, 710 single kidney transplants (SKTs) and 821 en bloc kidney transplants (EBKTs). Increased donor weight was associated with higher rates of recovery, transplantation and SKT. Low donor weight (linear $p < 0.001$; quadratic $p = 0.003$), SKT versus EBKT ($p = 0.008$), increased cold ischemia time ($p = 0.003$), local versus nonlocal donor ($p = 0.0044$), low versus high volume center ($p = 0.003$) and the interaction term between center volume and donor weight ($p = 0.0024$) were associated with graft failure. Notably, lower donor weight exacerbated the negative impact of low center volume but did not worsen the negative impact of SKT on outcomes. Our data show that EBKT offers superior 1-year survival at the expense of accomplishing one rather than two transplants. However, SKTs yield excellent outcomes when performed at experienced centers.

19. Graft Growth and Podocyte Dedifferentiation in Donor-Recipient Size Mismatch Kidney Transplants

Müller-Deile J, Bräsen JH, Pollheimer M et al.

Transplant Direct. 2017 Sep 5;3(10):e210

ABSTRACT

BACKGROUND: Kidney transplantation is the treatment choice for patients with end-stage renal diseases. Because of good long-term outcome, pediatric kidney grafts are also accepted for transplantation in adult recipients despite a significant mismatch in body size and age between donor and recipient. These grafts show a remarkable ability of adaptation to the recipient body and increase in size in a very short period, presumably as an adaptation to hyperfiltration.

METHODS: We investigated renal graft growth as well as glomerular proliferation and differentiation markers Kiel-67, paired box gene 2 and Wilms tumor protein (WT1) expression in control biopsies from different transplant constellations: infant donor for infant recipient, infant donor for child recipient, infant donor for adult recipient, child donor for child recipient, child donor for adult recipient, and adult donor for an adult recipient.

RESULTS: We detected a significant increase in kidney graft size after transplantation in all conditions with a body size mismatch, which was most prominent when an infant donated for a child. Podocyte WT1 expression was comparable in different transplant conditions, whereas a significant increase in WT1 expression could be detected in parietal epithelial cells, when a kidney graft from a child was transplanted into an adult. In kidney grafts that were relatively small for the recipients, we could detect reexpression of podocyte paired box gene 2. Moreover, the proliferation marker Kiel-67 was expressed in glomerular cells in grafts that increased in size after transplantation.

CONCLUSIONS: Kidney grafts rapidly adapt to the recipient size after transplantation if they are transplanted in a body size mismatch constellation. The increase in transplant size is accompanied by an upregulation of proliferation and dedifferentiation markers in podocytes. The different examined conditions exclude hormonal factors as the key trigger for this growth so that most likely hyperfiltration is the key trigger inducing the rapid growth response.

20. Very small pediatric donor kidney transplantation in pediatric recipients

Yaffe HC, Friedmann P, Kayler LK.

Pediatr Transplant. 2017 Aug;21(5).

ABSTRACT

Kidneys from very small pediatric donors (age <5 years, weight <21 kg) may be a means to increase the donor pool for pediatric recipients. Transplantation of small pediatric kidneys is more commonly performed in adult recipients due to the increased risks of technical complications, thrombosis, and early graft failure. While these risks are abrogated in adult recipients by limiting the donor weight to ≥10 kg and using the EB technique, it is unknown whether pediatric recipients achieve comparable results. US national data were assessed for all first-time, deceased-donor, kidney-only pediatric recipients, 1/1996-10/2013, who received very small pediatric donor grafts or grafts from ideal adult donors. We identified 57 pediatric EB, 110 pediatric SK, and 2350 adult transplants. The primary outcome was 3-year all-cause graft survival. Kaplan-Meier curves showed worse outcomes for pediatric grafts compared to adult ideal grafts (P=.042). On multivariate analysis, pediatric recipients of SK grafts had significantly higher HRs (aHR 2.01, 95% CI 1.34-3.00) and pediatric recipients of EB grafts had somewhat higher non-significant HRs (1.57; 95% CI 0.88-2.79) for graft survival. These results suggest cautionary use of very small pediatric donors as a source to expand the donor pool for pediatric candidates.

21. Optimizing the utilization of kidneys from small pediatric deceased donors under 15 kg by choosing pediatric recipients

Sui M, Zhao W, Chen Y et al.

Pediatr Transplant. 2016 Feb;20(1):39-43.

ABSTRACT

Currently, most kidneys from small pediatric deceased donors are transplanted into adult recipients (i.e., PTA). However, due to the weight mismatch, there is a high discard rate and a high ratio of EBKTs if adopting PTA. Here, we sought both to optimize utilization of these challenging but scarce donor grafts by selecting pediatric recipients and to characterize the feasibility and efficacy of this PTP allocation strategy. From February 2012 to October 2014, kidneys from 27 infant donors ≤ 15 kg were procured and distributed to 38 pediatric candidates in our center. The grafts were utilized for EBKT if the donor weighed 2.5-5 kg and for SKT if the donor weighed 5-15 kg, leading to 10 EBKTs and 28 SKTs. The overall utilization rate from small pediatric deceased donors was 94.12%. After a follow-up of 3-26 months, the graft survival rate was 89.47%, with four graft losses due to vascular thrombosis. Kidneys from low-body-weight donors should be applied to pediatric recipients, and the kidneys from infant donors ≥ 5 kg can be used in single-kidney-transplant procedures at experienced centers to optimize utilization.

3. DONANTE AÑOSO

22. Kidney Transplantation From Elderly Donor

S. Tekin, H.A. Yavuzb, Y. Yuksel et al.
Transplantation Proceedings, 47, 1309e1311 (2015)

ABSTRACT
AIM: In recent years, there has been an increase in usage of grafts from advanced-age donors because of the shortage of organ availability. Acceptance of elderly living-kidney donors remains controversial due to the higher incidence of comorbidity and greater risk of postoperative complications. The objective of this study was to evaluate the graft function and patient survival using kidneys from living-related and unrelated donors who were older than 65 years of age.
MATERIALS AND METHODS: From December 2008 until December 2013 we compared the outcomes of 294 patients (mean age, 47.67 ± 12.4 years; range, 16 to 74 years old) who received grafts from donors ≥65 years old to 2339 patients who received grafts from donors who were younger than 65 years old.
RESULTS: We observed no significant differences in sex, time on dialysis, or cold ischemia time between the groups. The recipient ages between two groups were similar. For survival analysis we used the Kaplan-Meier survival estimator. Patient survival at 1, 2, and 3 years was 91.1%, 89.1%, and 88.5%, respectively, for patients transplanted with kidneys from donors ≥65-years-old vs 96.7%, 95.9%, and 95.0%, respectively, in the <65-year-old donor group. Multivariate analysis showed the variables associated with patient survival to be donor age at time of transplantation in years (hazard ratio [HR], 1.65; 95% confidence interval [CI], 1.59e1.71; P < .05), time on dialysis in months (HR, 1.22; 95% CI, 1.21e1.23; P = .002). Graft survival rates at 1, 2, and 3 years censored for death with functional graft at was 97.6%, 96.4%, and 94.1%, respectively, for patients transplanted with kidneys from donors older than 65 years vs 97.5%, 96.8%, and 95.2%, respectively, in the <65-year-old donor group. Multivariate analysis, HLA-DR mismatches (HR, 1.23; 95% CI, 1.12e1.55; P = .050), delayed graft function (HR, 1.77; 95% CI, 1.53e2.07; P = .021), and perhaps acute rejection (HR 1.14; 95% CI, 0.82e1.95; P = .093) were the variables associated with graft survival.
CONCLUSION: We concluded that the use of kidneys from donors older than 65 years of age allows us to increase the rate of renal transplantation to approximately 15 to 20 per million population, with good graft and patient survivals provided that the protocol for expanded criteria organs ensured proper macroscopic and microscopic evaluation of the organ for transplantation.

23. The association of donor and recipient age with graft survival in paediatric renal transplant recipients in a European Society for Paediatric Nephrology/European Renal Association–European Dialysis and Transplantation Association Registry study

Chesyane NC, van Stralen KJ, Bonthuis M et al.
Nephrol Dial Transplant (2017) 1–8.

ABSTRACT
BACKGROUND: The impact of donor age in paediatric kidney transplantation is unclear. We therefore examined the association of donor–recipient age combinations with graft survival in children.

METHODS: Data for 4686 first kidney transplantations performed in 13 countries in 1990–2013 were extracted from the ESPN/ERA-EDTA Registry. The effect of donor and recipient age combinations on 5-year graft-failure risk, stratified by donor source, was estimated using Kaplan–Meier survival curves and Cox regression, while adjusting for sex, primary renal diseases with a high risk of recurrence, pre-emptive transplantation, year of transplantation and country.
RESULTS. The risk of graft failure in older living donors (50–75 years old) was similar to that of younger living donors {adjusted hazard ratio [aHR] 0.74 [95% confidence interval (CI) 0.38–1.47]}. Deceased donor (DD) age was non-linearly associated with graft survival, with the highest risk of graft failure found in the youngest donor age group [0–5 years; compared with donor ages 12–19 years; aHR 1.69 (95% CI 1.26–2.26)], especially among the youngest recipients (0–11 years). DD age
had little effect on graft failure in recipients' ages 12–19 years.
CONCLUSIONS. Our results suggest that donations from older living donors provide excellent graft outcomes in all paediatric recipients. For young recipients, the allocation of DDs over the age of 5 years should be prioritized.

24. Living Kidney Donors Ages 70 and Older: Recipient and Donor Outcomes
Beger JC, Muzaale D, James N et al.
Clin J Am Soc Nephrol 6: 2887–2893, 2011.

ABSTRACT
BACKGROUND AND OBJECTIVES: The profound organ shortage has resulted in longer waiting times and increased mortality for those awaiting kidney transplantation. Consequently, patients are turning to older living donors. It is unclear if an upper age limit for donation should exist, both in terms of recipient and donor outcomes.
DESIGN, SETTING, PARTICIPANTS, & MEASUREMENTS: In the United States, 219 healthy adults aged ≥70 have donated kidneys at 80 of 279 transplant centers. Competing risks models with matched controls were used to study the independent association between older donor age and allograft survival, accounting for the competing risk of recipient mortality as well as other transplant factors.
RESULTS: Among recipients of older live donor allografts, graft loss was significantly higher than matched 50-to 59-year-old live donor allografts (subhazard ratio [SHR] 1.62, 95% confidence interval [CI] 1.16 to 2.28, P= 0.005) but similar to matched nonextended criteria 50-to 59-year-old deceased donor allografts (SHR 1.19, 95% CI 0.87 to 1.63, P = 0.3). Mortality among living kidney donors aged ≥70 was no higher than healthy matched controls drawn from the NHANES-III cohort; in fact, mortality was lower, probably reflecting higher selectivity among older live donors than could be captured in National Health and Nutrition Examination Survey III (NHANES-III; HR 0.37, 95% CI 0.21 to 0.65, P <0.001).
CONCLUSIONS: These findings support living donation among older adults but highlight the advantages of finding a younger donor, particularly for younger recipients.

25. Relative Importance of HLA Mismatch and Donor Age to Graft Survival in Young Kidney Transplant Recipients
Foster BJ, Dahhou M, Zhang X et al.
Transplantation 2013;96: 469Y475.

ABSTRACT
BACKGROUND: The American deceased-donor (DD) kidney allocation algorithm for children emphasizes the importance of younger donors and shorter waiting times over human leukocyte antigen (HLA) matching. We sought to compare the relative importance of donor age with that of HLA mismatching (MM) on graft survival.
METHODS: We studied patients less than 21 years old recorded in the U.S. Renal Data System, who received a first transplant from a DD 5 years old or younger or from a living donor (LD). Using separate Cox proportional hazards models for DD and LD recipients, we estimated the adjusted 5-year probability of graft survival for each donor age YHLA MM combination and compared estimated graft survival across the different HLA MMY donor age combinations.
RESULTS: Both donor age and HLA MM were significantly associated with DD graft survival, whereas only HLA MM had a significant association with LD graft survival. Compared with DD grafts from less than 35-year-old 4Y6 MM donors, survival was not significantly different for 0Y1 and 2Y3 MM grafts from 35- to 44-year-old donors or for 0Y1 MM grafts from donors 45 years old or older. The most poorly matched grafts from the oldest LD had survival similar to or better than any DD.
CONCLUSIONS: Donor age and HLA MM both play important roles in determining DD graft survival. The advantages of younger donors offset the disadvantages of poorer HLA matching, and better HLA matching offsets the disadvantages of older donor age.

26. Contribution of Prolonged Ischemia and Donor Age to Chronic Renal Allograft Dysfunction
Tullius SG, Reutzel-Selke A, Egermann F et al.
J Am Soc Nephrol 11: 1317–1324, 2000.

ABSTRACT
As a consequence of an advancing discrepancy between supply of suitable grafts and demand from potential recipients, less than optimal organs are increasingly being used. Although clinical studies demonstrate the involvement of various risk factors, including donor age and duration of ischemia on long-term graft outcome, their individual contribution and correlation has not been followed experimentally. After cold ischemic times of 5, 60, and 120 min, kidney allografts of 3-, 12-, and 18-mo-old Fischer 344 donors were transplanted into 3-mo-old Lewis rats. Age-related changes were examined in matched native uninephrectomized controls. Proteinuria and creatinine clearance were determined, and histologic and immunohistologic studies were assessed and quantified at the end of the observation period (20 wk). All grafts functioned satisfactorily with the exception of one graft each from 12- and 18-mo-old donors with prolonged ischemia (120 min). Functional deterioration and structural changes progressed in parallel to increasing donor age and prolonged ischemia. The impact of expanded ischemia was particularly detrimental in grafts from older donor animals. Donor age and duration of ischemia act in a synergistic manner in our model. Brief ischemic times seem of particular relevance when grafts from older donors are being used.

27. Risk of End-StageRenal Disease Following Live Kidney Donation
Muzaale AD, Massie AB, Wang MC et al.
JAMA. 2014;311(6):579-586..
ABSTRACT

IMPORTANCE: Risk of end-stage renal disease (ESRD) in kidney donors has been compared with risk faced by the general population, but the general population represents an unscreened, high-risk comparator. A comparison to similarly screened healthy nondonors would more properly estimate the sequelae of kidney donation.
OBJECTIVES: To compare the risk of ESRD in kidney donors with that of a healthy cohort of nondonors who are at equally low risk of renal disease and free of contraindications to live donation and to stratify these comparisons by patient demographics.
DESIGN, SETTINGS, AND PARTICIPANTS: A cohort of 96 217 kidney donors in the United States between April 1994 and November 2011 and a cohort of 20 024 participants of the Third National Health and Nutrition Examination Survey (NHANES III) were linked to Centers for Medicare & Medicaid Services data to ascertain development of ESRD, which was defined as the initiation of maintenance dialysis, placement on the waiting list, or receipt of a living or deceased donor kidney transplant, whichever was identified first. Maximum follow-up was 15.0 years; median follow-up was 7.6 years (interquartile range [IQR], 3.9-11.5 years) for kidney donors and 15.0 years (IQR, 13.7-15.0 years) for matched healthy nondonors.
MAIN OUTCOMES AND MEASURES: Cumulative incidence and lifetime risk of ESRD.
RESULTS: Among live donors, with median follow-up of 7.6 years (maximum, 15.0), ESRD developed in 99 individuals in a mean (SD) of 8.6 (3.6) years after donation. Among matched healthy nondonors, with median follow-up of 15.0 years (maximum, 15.0), ESRD developed in 36 nondonors in 10.7 (3.2) years, drawn from 17 ESRD events in the unmatched healthy nondonor pool of 9364. Estimated risk of ESRD at 15 years after donation was 30.8 per 10 000 (95%CI, 24.3-38.5) in kidney donors and 3.9 per 10 000 (95%CI, 0.8-8.9) in their matched healthy nondonor counterparts ($P < .001$). This difference was observed in both black and white individuals, with an estimated risk of 74.7 per 10 000 black donors (95%CI, 47.8-105.8) vs 23.9 per 10 000 black nondonors (95%CI, 1.6-62.4; $P < .001$) and an estimated risk of 22.7 per 10 000 white donors (95%CI, 15.6-30.1) vs 0.0 white nondonors ($P < .001$). Estimated lifetime risk of ESRD was 90 per 10 000 donors, 326 per 10 000 unscreened nondonors (general population), and 14 per 10 000 healthy nondonors.
CONCLUSIONS AND RELEVANCE: Compared with matched healthy nondonors, kidney donors had an increased risk of ESRD over a median of 7.6 years; however, the magnitude of the absolute risk increase was small. These findings may help inform discussions with persons considering live kidney donation.

28. Kidney-Failure Risk Projection for the Living Kidney-Donor Candidate
Spital A.
N Engl J Med. 2016 May 26;374(21):2093

Abstract not available

29. Comparison of survival outcomes between Expanded Criteria Donor and Standard Criteria Donor kidney transplant recipients: a systematic review and meta-analysis.
Querard AH, Foucher Y, Combescure C et al.
Transpl Int. 2016 Apr;29(4):403-15.

ABSTRACT

In 2002, the United Network for Organ Sharing proposed increasing the pool of donor kidneys to include Expanded Criteria Donor (ECD). Outside the USA, the ECD definition remains the one used without questioning whether such a graft allocation criterion is valid worldwide. We performed a meta-analysis to quantify the differences between ECD and Standard Criteria Donor (SCD) transplants. We paid particular attention to select studies in which the methodology was appropriate and we took into consideration the geographical area. Thirty-two publications were included. Only five studies, all from the USA, reported confounder-adjusted hazard ratios comparing the survival outcomes between ECD and SCD kidney transplant recipients. These five studies confirmed that ECD recipients seemed to have poorer prognosis. From 29 studies reporting appropriate survival curves, we estimated the 5-year pooled nonadjusted survivals for ECD and SCD recipients. The relative differences between the two groups were lower in Europe than in North America, particularly for death-censored graft failure. It is of primary importance to propose appropriate studies for external validation of the ECD criteria in non-US kidney transplant recipients.

30. Mortality among Younger and Older Recipients of Kidney Transplants from Expanded Criteria Donors Compared with Standard Criteria Donors

Ma MK, Lim WH, Craig JC et al.

Clin J Am Soc Nephrol 11: 128–136, 2016.

ABSTRACT

BACKGROUND AND OBJECTIVES: The quality and age of donor organs are known to have a major effect on patient and graft outcomes, but it is uncertain whether this association is uniform for all recipients. We aimed to determine whether the use of expanded criteria deceased donor (ECD) kidneys for transplantation compared with standard criteria deceased donor (SCD) kidneys has a different association with survival in younger (age ,60 years old) compared with older (age $60 years old) recipients.

DESIGN, SETTING, PARTICIPANTS, & MEASUREMENTS: Using data from the Australian and New Zealand Dialysis and Transplant Registry (1997–2009), we compared the risk of all-cause mortality and death with functioning graft among younger and older recipients who had received either an SCD or an ECD kidney using the adjusted Cox proportional hazard models.

RESULTS: In total, 3822 patients were transplanted between 1997 and 2009. Over a follow-up period of 21,249 person-years (a median duration of 5.3 years [interquartile range, 2.22–8.6 years]), 567 recipients (n=385 for those age,60 years old; n=182 for those age$60 years old) died. Recipient age was an effect modifier between donor types, all-cause mortality, and death with functioning graft (P values for interaction were 0.05 and 0.04, respectively). In younger recipients, there was an excess risk of all-cause mortality (adjusted hazard ratio [HR], 1.55; 95% confidence interval [95%CI], 1.23 to 1.97) and death with functioning graft (adjusted HR, 1.72; 95% CI, 1.28 to 2.29) after transplantation with ECD kidneys compared with SCD kidneys, but there was no statistically significant association among older recipients (adjusted HR, 1.11; 95% CI, 0.80 to 1.54 and adjusted HR, 1.30; 95% CI, 0.89 to 1.89, respectively). This excess risk was largely caused by death from cardiovascular disease.

CONCLUSIONS: There was an excess risk of all-cause mortality and death with functioning graft when younger recipients were transplanted with ECD kidneys compared with SCD kidneys. These findings suggest that caution is needed in allocating ECD kidneys to younger recipients.

31. A Comprehensive Risk Quantification Score for Deceased Donor Kidneys: The Kidney Donor Risk Index

Rao PS, Schaubel DE, Guidinger MK et al.

Transplantation 2009;88: 231–236).

ABSTRACT

BACKGROUND: We propose a continuous kidney donor risk index (KDRI) for deceased donor kidneys, combining donor and transplant variables to quantify graft failure risk.

METHODS: By using national data from 1995 to 2005, we analyzed 69,440 first-time, kidney-only, deceased donor adult transplants. Cox regression was used to model the risk of death or graft loss, based on donor and transplant factors, adjusting for recipient factors. The proposed KDRI includes 14 donor and transplant factors, each found to be independently associated with graft failure or death: donor age, race, history of hypertension, history of diabetes, serum creatinine, cerebrovascular cause of death, height, weight, donation after cardiac death, hepatitis C virus status, human leukocyte antigen-B and DR mismatch, cold ischemia time, and double or en bloc transplant. The KDRI reflects the rate of graft failure relative to that of a healthy 40-year-old donor.

RESULTS: Transplants of kidneys in the highest KDRI quintile (>1.45) had an adjusted 5-year graft survival of 63%, compared with 82% and 79% in the two lowest KDRI quintiles (<0.79 and 0.79–<0.96, respectively). There is a considerable overlap in the KDRI distribution by expanded and nonexpanded criteria donor classification. Conclusions. The graded impact of KDRI on graft outcome makes it a useful decision-making tool at the time of the deceased donor kidney offer.

32. Kidney transplant outcomes from older deceased donors: A paired kidney analysis by the European Renal Association-European Dialysis and Transplant Association Registry (ERA-EDTA Registry)

Pippias M, Jager KJ, Caskey F et al.

Transpl Int. 2018 Jul;31(7):708-719.

ABSTRACT

As the median age of deceased kidney donors rises, updated knowledge of transplant outcomes from older deceased donors in differing donor-recipient age groups is required.

Using ERA-EDTA Registry data we determined survival outcomes of kidney allografts donated from the same older deceased donor (55-70 years), and transplanted into one recipient younger and one recipient of similar age to the donor. The recipient pairs were divided into two groups: group 1; younger (median age: 52 years) and older (60 years), and group 2; younger (41 years) and older (60 years). 1,410 adults were transplanted during 2000-2007. Compared to the older recipients the mean number of functioning graft years at 10-years was six months longer in the group 1 and group 2 younger recipients (p<0.001). Ten-year graft survival was 54% and 40% for the group 1 younger and older recipients, and 60% and 49% for the group 2 younger and older recipients. Paired Cox regression analyses showed a lower risk of graft failure (group 1 younger; adjusted relative risk [RRa]:0.57, 95%CI:0.41-0.79, and group 2 younger; RRa:0.63, 95%CI:0.47-0.85) in younger recipients. Outcomes from older deceased donor allografts transplanted into differing donor-recipient age groups are better than previously reported. These allografts remain a valuable transplant resource, particularly for similar-aged recipients.

33. Grandparent donors in paediatric renal transplantation

Simpson CM, McTaggart SJ, Sterne JA et al.

Pediatr Nephrol. 2005 Nov;20(11):1636-41.

ABSTRACT

The outcome of transplantation from grandparent donors in comparison with parental donors in paediatric renal transplantation was evaluated in 53 living related donor (LRD) transplantations performed between January 1996 and August 2003. The donor in 13 cases (25%) was a grandparent (Gpar group), and the remaining donors formed the parent group (Par group). The median age of recipients in the Gpar group was 2.75 (1.7-10.6) years and in the Par group was 12.75 (2.4-22) years (P<0.0001). There was no evidence of a difference in patient and graft survival, glomerular filtration rate (GFR) after transplantation, or the number of biopsy proven episodes of rejection between the groups. Doses of prednisolone in the first year following transplantation were greater in recipients from Gpar donors, but the other immunosuppression doses were similar. The median age of donors in the Gpar group was 56 (50-67) years and in the Par group was 41 (27-58) years (P<0.0001). There was no evidence of a difference between the two donor groups in mean creatinine clearance at last follow-up. There were two major donor complications in the Gpar group and one in the Par group. There was no evidence that the length of stay differed between the two groups in either the donors or recipients. These results support the use of carefully selected healthy grandparents as LRDs in children. This option potentially allows for the use of parent donors for a subsequent transplantation.

34. Outcomes in Kidney Transplant Recipients From Older Living Donors

Englum BR, Schechter MA, Irish WD et al.

Transplantation 2015;99: 309–315.

ABSTRACT

BACKGROUND: Previous studies demonstrate that graft survival from older living kidney donors (LD; age >60 years) is worse than younger LD but similar to deceased standard criteria donors (SCD). Limited sample size has precluded more detailed analyses of transplants from older LD.

METHODS: Using the United Network for Organ Sharing database from 1994 to 2012, recipients were categorized by donor status: SCD, expanded criteria donor (ECD), or LD (by donor age: <60, 60–64, 65–69, ≥70 years). Adjusted models, controlling for donor and recipient risk factors, evaluated graft and recipient survivals.

RESULTS: Of 250,827 kidney transplants during the study period, 92,646 were LD kidneys, with 4.5% of these recipients (n = 4,186) transplanted with older LD kidneys. The use of LD donors 60 years or older increased significantly from 3.6% in 1994 to 7.4% in 2011. Transplant recipients with older LD kidneys had significantly lower graft and overall survival compared to younger LD recipients. Compared to SCD recipients, graft survival was decreased in recipients with LD 70 years or older, but overall survival was similar. Older LD kidney recipients had better graft and overall survival than ECD recipients.

CONCLUSIONS: As use of older kidney donors increases, overall survival among kidney transplant recipients from older living donors was similar to or better than SCD recipients, better than ECD recipients, but worse than younger LD recipients. With increasing kidney donation from older adults to alleviate profound organ shortages, the use of older kidney donors appears to be an equivalent or beneficial alternative to awaiting deceased donor kidneys.

35. The relationship of donor source and age on short- and long-term allograft survival in pediatric renal transplantation

Dale-Shall AW, Smith JM, McBride MA et al.
Pediatr Transplantation 2009: 13: 711–718.

ABSTRACT
Limited pediatric data on allograft survival from advanced aged kidney donors exist. To determine the influence of donor source and age on allograft survival in pediatric renal transplant recipients, we analyzed the OPTN database. Allograft survival for 7291 pediatric renal transplants was evaluated. Up to five yr post-transplantation, graft survival was higher for LD vs. DD recipients. At seven yr, allograft survival was 71% in 18–54 yr-old LD recipients, 59.1% in ≥55 yr-old LD, and 45.1% in ≥50 yr-old DD recipients. An approximate 35% improvement in allograft survival in 18–54 yr-old LD recipients was observed. Multivariate results showed that recipients of LD 35–49 (aRR 0.66, 95% CI 0.55–0.80) and LD 50–54 (aRR 0.65, 95% CI 0.45–0.94) have a graft survival advantage over the ideal DD. In LD ≥55 yr, no improvement in graft survival was observed when compared with the 18–34 yr-old DD. In summary, we observed in a pediatric population, <55 yr-old LD kidneys afford improved long-term allograft survival when compared with DD kidney recipients. Increasing awareness of the long-term graft survival advantage for children receiving an LD kidney, even from older donors, should be a priority.

36. Pediatric Kidney Transplantation: Analysis of Donor Age, HLA Match, and Posttransplant Non-Hodgkin Lymphoma: A Collaborative Transplant Study Report

Opelz G and Döhler B.
Transplantation 2010;90: 292–297.

ABSTRACT
BACKGROUND: The impact and relationship of donor age, human leukocyte antigen (HLA) matching, and posttransplant non-Hodgkin lymphoma in pediatric kidney recipients are not completely understood.
METHODS: We analyzed Collaborative Transplant Study data from 9209 pediatric kidney transplant recipients to examine the effects of donor age and HLA match on graft survival and the relationship between HLA match and occurrence of non-Hodgkin lymphoma.
RESULTS: Survival rates using donors aged 11 to 17, 18 to 34, or 35 to 49 years were similar. Cox regression analysis showed that two HLA-DR mismatches were associated with lower graft survival in transplants performed during 1988 to 1997 (P<0.001) but not during the 1998 to 2007 period (P=0.95). A hierarchical relationship was observed for the effect of increasing numbers of combined HLA-A+B+DR mismatches on graft survival during the 1988 to 1997 (P<0.001) and the 1998 to 2007 period (P<0.001). An association between two HLA-DR mismatches and non-Hodgkin lymphoma was demonstrated by multivariate analysis (hazard ratio for 2 vs. 0–1 DR mismatches 2.04, P=0.021), and the result was consistent during both 10-year periods.
CONCLUSION: We recommend that (1) kidneys from deceased donors up to 49 years be allocated to children, (2) an acceptable HLA-A+B+DR match be attempted in patients with relatively common HLA phenotypes, and (3) transplants with two HLA-DR mismatches be avoided to reduce the risk of posttransplant non-Hodgkin lymphoma.

4. POLÍTICA DE HIPER-EXPANSIÓN Y ACTITUD PERI-OPERATORIA Y POST-OPERATORIA EN LA DISOCIACIÓN DONANTE-RECEPTOR

37. Impact and Application of Donor/Recipient Body Surface Area on Kidney Transplantation from Pediatric Donor to Adult Recipient

Cheng K, Ye Q, Ming Y et al.
Transplantation Proceedings, 48, 3274-3278 (2016).

ABSTRACT
BACKGROUND: Insufficient nephron dosing is closely associated with poor graft function and graft loss. Donor/recipient body surface area (D/R BSA) has been proven to be one of the useful predictors for sufficient nephron dosing. However, little is known regarding the impact and application of D/R BSA on kidney transplantation from pediatric donor to adult recipient.
METHODS: We retrospectively analyzed 26 cases of kidney transplantations from pediatric donors to adult recipients, which were performed in our center from 2010 through 2014. Patients were divided into 2 groups based on D/R BSA: group A, <0.8; and group B, ≥0.8. All recipients received a single kidney. Demographics of donors and recipients, early postoperative complications, estimated glomerular filtration rate (eGFR), and short-term (≤1 y) graft survival were compared between groups to evaluate the impact of D/R BSA on kidney transplantations from pediatric donors.
RESULTS: All demographics and early postoperative complications of group A were similar to those of group B (P > .05). eGFR in group A and group B at 1, 3, 6, and 12 months after transplantation were: 63.2 ± 5.0 vs 74.0 ± 7.6 (P = .008), 66.2 ± 4.9 vs 75.8 ± 5.9 (P = .004), 69.0 ± 4.8 vs 79.0 ± 6.3 (P = .004), and 69.4 ± 7.9 vs 79.2 ± 8.4 (P = .033). Short-term graft survival of group A was inferior to that of group B (62.5% vs 94.4%; P = .042).
CONCLUSIONS: We conclude that recipients with high D/R BSA are more likely to have better graft function. It is possible to make optimal allocation of pediatric donor kidneys on the basis of D/R BSA ≥0.8.

38. Strategies to optimize kidney recovery and preservation in transplantation: specific aspects in pediatric transplantation

Khalifeh T, Baulier E, Le Pape S et al.
Pediatr Nephrol (2015) 30:1243–1254.

ABSTRACT
In renal transplantation, live donor kidney grafts are associated with optimum success rates due to the shorter period of ischemia during the surgical procedure. The current shortage of donor organs for adult patients has caused a shift towards deceased donors, often with co-morbidity factors, whose organs are more sensitive to ischemia–reperfusion injury, which is unavoidable during transplantation. Donor management is pivotal to kidney graft survival through the control of the ischemia– reperfusion sequence, which is known to stimulate numerous deleterious or regenerative pathways. Although the key role of endothelial cells has been established, the complexity of the injury, associated with stimulation of different cell signaling pathways, such as unfolded protein response and cell death, prevents the definition of a unique therapeutic target. Preclinical transplant models in large animals are necessary to establish relationships and kinetics

and have already contributed to the improvement of organ preservation. Therapeutic strategies using mesenchymal stem cells to induce allograft tolerance are promising advances in the treatment of the pediatric recipient in terms of reducing/withdrawing immunosuppressive therapy. In this review we focus on the different donor management strategies in kidney graft conditioning and on graft preservation consequences by highlighting the role of endothelial cells. We also propose strategies for preventing ischemia–reperfusion, such as cell therapy.

39. Intraoperative biomarkers in renal transplantation

Lohkamp LN, Öllinger R, Chatzigeorgiou A et al.

Nephrology (Carlton). 2016 Mar;21(3):188-99.

ABSTRACT

The emerging need for biomarkers in the management of renal transplantation is highlighted by the severity of related complications such as acute renal failure and ischaemia/reperfusion injury (IRI) and by the increasing efforts to identify novel markers of these events to predict and monitor delayed graft function (DGF) and long-term outcome. In clinical studies candidate markers such as kidney injury molecule-1, neutrophil gelatinase-associated lipocalin and interleukin-18 have been demonstrated to be valid biomarkers with high predictive value for DFG in a post-transplant setting. However, studies investigating biomarkers for early diagnosis of IRI and assumable DGF as well as identification of potential graft recipients at increased risk at the time point of transplantation lack further confirmation and translation into clinical practice. This review summarizes the current literature on the value of IRI biomarkers in outcome prediction following renal transplantation as well their capacity as surrogate end points from an intraoperative perspective.

40. A survey of the anesthetic management of pediatric kidney transplantation in France

Marsac L, Michelet D, Sola C et al.

Pediatric Transplantation. 2019;00:e13509.

ABSTRACT

BACKGROUND: Renal transplantation is the best available therapeutic option for end-stage renal failure in both children and adults. However, little is known about anesthetic practice during pediatric renal transplantation.

MATERIAL AND METHODS: The study consisted of a national survey about anesthetic practice during pediatric renal transplantation in France. French tertiary pediatric centers performing renal transplants were targeted, and one physician from each team was asked to complete the survey. The survey included patient data, preoperative assessment and optimization data, and intraoperative anesthesia data (drugs, ventilation, and hemodynamic interventions).

RESULTS: Twenty centers performing kidney transplantation were identified and contacted to complete the survey, and eight responded. Surveyed centers performed 96 of the 122 pediatric kidney transplantations performed in France in 2017 (79%). Centers consistently performed echocardiography and ultrasound examinations of the great veins preoperatively and consistently employed esophageal Doppler cardiac output estimation and vasopressors intraoperatively. All other practices were found to be heterogeneous. Central venous pressure was monitored in six centers, and dopamine was administered perioperatively in two centers.

CONCLUSIONS: The current study provides a snapshot of the perioperative management of pediatric kidney transplantation in France. Results emphasize the need for both standardization of practice and awareness of recent evidence against the use of CVP monitoring and dopamine infusions.

41. The prognostic value of the furosemide stress test in predicting delayed graft function following deceased donor kidney transplantation

McMahon BA, Koyner JL, Novick T et al.
Biomarkers. 2018 February ; 23(1): 61–69.

ABSTRACT
OBJECTIVES AND METHODS: The Furosemide Stress Test (FST) is a novel dynamic assessment of tubular function that has been shown in preliminary studies to predict patients who will progress to advanced stage acute kidney injury, including those who receive renal replacement therapy (RRT). The aim of this study is to investigate if the urinary response to a single intraoperative dose of intravenous furosemide predicts delayed graft function (DGF) in patients undergoing deceased donor kidney transplant.
RESULTS: On an adjusted multiple logistic regression, a single 100 mg dose of intraoperative furosemide after the anastomosis of the renal vessels (FST) predicted the need for RRT at 2 and 6 h post kidney transplantation (KT). Recipient urinary output was measured at 2 and 6 h post furosemide administration. In receiver-operating characteristic (ROC) analysis, the FST predicted DGF with an area-under-the curve of 0.85 at an optimal urinary output cut-off of <600 mls at 6 h with a sensitivity of and a specificity of 83% and 74%, respectively.
CONCLUSIONS: The FST is a predictor of DGF post kidney transplant and has the potential to identify patients requiring RRT early after KT.

42. Intraoperative hemodynamic factors predicting early postoperative renal function in pediatric kidney transplantation

Michelet D, Brasher C, Marsac L et al.
Paediatr Anaesth. 2017 Sep;27(9):927-934.

ABSTRACT
BACKGROUND: The anesthetic management of kidney transplantation in children remains somewhat empirical. The goal of the present study was to investigate intraoperative hemodynamic factors affecting posttransplantation kidney function.
METHODS: We performed a retrospective analysis of data from patients undergoing kidney transplantation in our pediatric teaching hospital from 2000 to 2014. Data collected included: donor and recipient demographic data, recipient comorbidities, fluids administered intraoperatively, and intraoperative blood pressure and central venous pressure. The main outcome of the study was the creatinine clearance at day 1 corrected to a body surface area of 1.73 m^2. Analysis was performed using Classification Tree Analysis with 10-fold cross-validation.
RESULTS: One hundred and two patients were included. The following predictors of increased postoperative creatinine clearance at day 1 were identified: decreasing recipient weight, mean blood pressure-to-weight ratio 10 minutes after reperfusion, reduced cold ischemia duration, and increased intraoperative albumin infusion. Increased creatinine clearance was observed when

mean blood pressure-to-weight ratio 10 minutes after reperfusion was ≥4.3 in patients weighing 13-21 kg and ≥2.5 in those ≥22 kg. Overall, the model explained 64% (and at cross-validation 60%) of creatinine clearance variability at day 1.
CONCLUSION: Intraoperative hemodynamics during kidney transplantation should be optimized in order to increase mean blood pressure according to values indicated by our analyses. Cold ischemia duration should be shortened as far as possible.

43. Variation in Frequency of Intraoperative Arterial, Central Venous and Pulmonary Artery Catheter Placement During Kidney Transplantation: An Analysis of Invasive Monitoring Trends
Nagrebetsky A, Dutton RP, Ehrenfeld JM et al.
J Med Syst. 2018 Mar 2;42(4):66.

ABSTRACT
The rapidly increasing number of kidney transplantations warrants assessment of anesthesia care in this patient population. We explored the frequency of arterial catheter (AC), central venous catheter (CVC) and pulmonary artery catheter (PAC) placement during kidney transplantation in the USA using data from the National Anesthesia Clinical Outcomes Registry (NACOR) and assessed the between-facility variation in the frequency of catheter placement. We defined cases of kidney transplantation using Agency for Healthcare Research and Quality Clinical Classification Software. Placement of AC, CVC and PAC was defined by respective Current Procedural Terminology codes. The frequency of vascular catheter placement across facility types was compared using Pearson $\chi 2$ test. We identified 10,580 cases of kidney transplantation performed in 100 facilities from January 1, 2010 to December 31, 2014. Placement of an AC was reported in 1700 (16.1%), CVC in 2580 (24.4%) and PAC in 50 (0.5%) of cases. The frequency of placement of specific types of catheters was statistically different across facility types ($p < 0.001$). Within individual facilities that reported at least 50 cases of kidney transplantation, the percentages of cases performed with AC, CVC and PAC ranged from 0% to 86%, 0% to 90% and 0% to 3%, respectively. Considerable between-facility variation in the frequency of AC, CVC and PAC placement during kidney transplantation raises concerns about the need for better practice standardization. Excess invasive monitoring may represent a safety risk as well as unnecessary additional cost. If kidney transplantation can be safely performed without an AC, CVC or PAC in most patients, facilities with above-average catheter placement rates may have an opportunity for measurable reduction in catheter-related perioperative complications. Optimizing perioperative monitoring is an important component of ensuring high functioning, high-value medical systems.

44. Pediatric renal transplantation with considerations for successful outcomes
Salvatierra O Jr, Millan M, Concepcion W.
Semin Pediatr Surg. 2006 Aug;15(3):208-17.

ABSTRACT
Renal transplantation in the pediatric population, although conceptually similar to that in adults, differs in many aspects. This review will focus on the issues unique to the pediatric recipient. In particular, we will focus on the incidence and etiology of end stage renal disease in children, and the results as measured by patient and graft survival. Pretransplant surgical considerations of timing of the transplant, management of congenital urologic abnormalities and the abnormal

bladder will be addressed. Etiologies of renal failure unique to the pediatric population will be discussed, including autosomal recessive polycystic kidney disease, congenital nephrotic syndrome, inferior vena cava thrombosis, and primary hyperoxaluria Type 1. Lastly, special transplant surgical considerations including transplantation of an adult-size kidney (ASK) into an infant or small child and ureteral implantation, management of the urinary bladder, and fluid management in infants and small children will be discussed.

45. Adult-size kidneys without acute tubular necrosis provide exceedingly superior long-term graft outcomes for infants and small children

Sarwal MM, Cecka JM, Millan MT et al.

Transplantation. 2000 Dec 27;70(12):1728-36.

ABSTRACT

BACKGROUND: Infants with end-stage renal disease are at highest risk for early graft loss and mortality of any subgroup undergoing renal transplantation. This study evaluates the influence of donor tissue mass and acute tubular necrosis (ATN) on graft survival and incidence of acute rejection episodes in infant and small child recipients of living donor (LD) and cadaver (CAD) adult-size kidneys (ASKs), pediatric CAD kidneys and combined kidney-liver transplants. Methods. Kidney transplants in infants and small children at a single center and those reported to the UNOS Scientific Renal Transplant Registry were analyzed. At Stanford, multi-variate analysis was conducted on 45 consecutive renal allograft recipients weighing < or = 15 kg, mean weight 11.2 +/- 2.6 kg. The UNOS Registry results in age groups 0-2.5 (n=548) and 2.5-5 years (n=743) were compared with age groups 6-12, 13-18, and the lowest risk adult group of 19-45 years. STANFORD **RESULTS**. Graft survival was 97.8 +/- 0.0 at 2 years and 84.6 +/- 0.1% at 8 years. The incidence of biopsy proven rejection was 8.8% in the first 3 months and 15.5% over the 8-year follow-up. None of the pediatric CAD kidneys had ATN. Rejection episodes were restricted to the pediatric CAD kidneys alone (3/3), with no kidney rejections in the combined pediatric CAD kidney-liver transplants (0/6; P=0.003). Four ASK transplants had ATN (1 postoperative and 3 late), and all predisposed to subsequent acute rejection episodes (4/4), whereas there were no rejection episodes in ASK transplants without ATN (0/32; P<0.001). At 3 years posttransplantation, mean serum creatinines were worse in ASKs with ATN (1.5 vs. 0.9 mg/dL; P<0.001) and in all grafts with rejection episodes (1.2 vs. 0.9 mg/dL; P<0.05). UNOS RESULTS: Among the 5 age groups studied, significantly better (P<0.001) long-term graft survival rates were observed in allograft recipients in the 2 youngest age groups with ASKs without ATN: 82 +/- 3% and 81 +/- 3% for LD and 70 +/- 7% and 78 +/- 4% for CAD recipients in the 0-2.5 and 2.5- to 5-year age groups, respectively, at 6 years after transplantation. Moreover, the projected graft half-lives after the 1st year in the LD groups without ATN were at least equivalent to those of HLA-identical sibling recipients ages 19-45 years: 26.3 +/- 5 and 29.3 +/- 6 years for the 0- to 2.5- and 2.5- to 5-year age groups, respectively, and 23.3 +/- 1 years for HLA-identical transplants. The graft half-lives for CAD recipients without ATN ages 0-2.5 and 2.5-5 years were equivalent or better than those for LD transplants without ATN in recipients aged 19-45 years: 15.4+/- 7 and 23.7 +/- 8 years versus 15.0 +/- 0.3 years. Mean serum creatinines were superior in the 2 younger recipient age groups compared with older age groups. **CONCLUSIONS**: Increased donor tissue mass of the ASK or kidney-liver transplants, in the absence of ATN, seems to confer a protective effect to infant and small child recipients of these allografts. This is manifested by a prolonged rejection-free state in the single center experience and enhanced graft survival and function in the UNOS analysis, comparable to HLA identical sibling

transplants for LD infant and small child recipients and to LD adult results for CAD infant and small child recipients. To optimize this protective effect by whatever mechanism, absolute avoidance of ATN is essential in infant recipients of ASK or combined kidney-liver transplants.

46. Effect of donor/recipient body weight ratio, donor weight, recipient weight and donor age on kidney graft function in children

Špatenka J, Seeman T, Foltynová E et al.

Nephrol Dial Transplant (2012) 27: 820–824.

ABSTRACT

BACKGROUND: We hypothesized that supplementing a higher mass of renal parenchyma from adult donors, and their younger age, would improve graft function in paediatric recipients.

METHODS: We calculated estimated glomerular filtration rate (eGFR; Schwartz formula) and absolute glomerular filtration rate (absGFR) in 57 renal-grafted children (1995-2007) aged 3.1-17.9 years, weighing 12.9-85.0 kg, on discharge from the hospital after transplantation (TPL), 1 year after TPL and at the last follow-up (1.5-11.7 years after TPL). We correlated their eGFR with the individual ratio between the donor and the recipient body weight at the time of TPL (donor/recipient body weight ratio; D/R BWR), and we evaluated the effect of the donor and the actual recipient body weight on the eGFR and absGFR.

RESULTS: The D/R BWR varied from 0.65 to 5.23. We found a significant positive correlation between D/R BWR and eGFR at discharge from the hospital ($P < 0.001$), 1-year post-TPL ($P < 0.001$) and at the last follow-up ($P < 0.05$). Using multiple linear regression analyses, we found that both eGFR and absGFR values were much more determined by the actual recipient weight than by the donor weight (27/6% and 43/4% at discharge, by 24/4% and 57/0% 1 year after TPL, and 0/0% and 20/0% at the end of the follow-up). A tendency for lower eGFR with increasing age of donors was apparent at discharge and 1 year after TPL, but it reached statistical significance only at the last follow-up ($r = 0.4254$, $P < 0.01$).

CONCLUSION: In paediatric renal transplants, the value of D/R BWR directly correlated with eGFR in the early and late posttransplant periods. However, this correlation was mainly influenced by the recipient weight, while the donor weight played only a minor or negligible role.

47. Intraoperative management and early postoperative outcomes of pediatric renal transplants

Taylor K, Kim WT, Maharramova M et al.

Paediatr Anaesth. 2016 Oct;26(10):987-91.

ABSTRACT

INTRODUCTION: Smaller children are presenting for renal transplantation as the treatment of choice for end-stage renal disease. Adult donor organs are more successful than pediatric deceased donor organs. An adult kidney may sequester ~75% of the circulating volume of a 5 year-old child and requires significantly increased cardiac output to maintain renal perfusion. Treatment includes volume, inotropic or vasopressor agents, or central neuroaxial blockade for sympatholysis. We describe the perioperative anesthestic management as a guide to clinical outcomes.

METHODS: A retrospective chart review of renal transplant patients between 2006 and 2014 was performed. We recorded patient demographics, surgical and anesthetic factors and postoperative outcome.
RESULTS: One hundred and fifty-six children underwent renal transplantation, of which 38% were from living donors. There were 99/156 (63.5%) males. Median age was 10 years (range 1-17 years) and the mean weight was 36.2 kg (sd 20.6 kg; range 7.6-109.6 kg). There were 36 children ≤5 years of age and 14 children ≤2 years of age. One hundred and nineteen (77%) were dialysis dependent. Pharmacological support to increase renal perfusion included mannitol in 95%, and dopamine in 83%. Furosemide was used in 82% of cases. Inotropic therapy continued into the postoperative period in 34%. Radiological pulmonary edema was diagnosed in 33% and clinical pulmonary edema in 7%. Intraoperative use of dopamine delayed the time to creatinine nadir in all grafts (9.5 days vs 6.5 days, P = 0.04) and in deceased donor grafts (12.9 vs 7.4 days, P = 0.007). Patients who received dopamine had no significant difference in central venous pressure (CVP) preclamp removal, 14 mmHg vs 11.5 mmHg (P = 0.12) but a higher CVP after clamp removal, 14.3 mmHg vs 11.8 mmHg (P = 0.003).
CONCLUSION: Dopamine use was common and was an independent risk factor for delayed time to creatinine nadir. Many different agents were used to enhance renal perfusion. The 'supra-physiological' hemodynamics resulted in pulmonary edema in 33% of patients.

5. RECEPTOR MUY PEQUEÑO

48. Urologic issues in pediatric transplant recipients

Torricelli FCM, Watanabe A, Piovesan AC et al.
Transl Androl Urol 2019;8(2):134-140.

ABSTRACT
The limited supply of kidneys for pediatric transplantation leads to a large number of children in waiting transplant list. These patients have to be properly evaluated and prepared before organ transplantation to increase its success. The aim of this review is focus on urologic issues of pediatric kidney transplants such as preoperative evaluation and urinary tract abnormalities correction, surgical technique, and postoperative complications. All children that are candidates for kidney transplantation should be submitted to abdominal ultrasound. If bladder dysfunction is suspected, a more detailed evaluation is mandatory, including a voiding cystourethrography and urodynamic study. Patients with a poor bladder capacity and compliance will require bladder augmentation. Whenever possible the native ureter is recommended for that. Regarding kidney transplantation, recipient surgery can be safely performed through an extraperitoneal access, even in children weighting less than 10 kilograms. It allows adequate access to iliac vessels, aorta and vena cava. Graft survival continued to improve over the past decade and it is around 80% in 5 years. Postoperative complications such as urinary fistula may occur in less than 5% of cases, while vascular complications are reported in 1% to 2% of cases.

49. Survival and clinical outcomes of children starting renal replacement therapy in the neonatal period

Van Stralen KJ, Borzych-Duzalka D, Hataya H et al.
Kidney International (2014) 86, 168–174.

ABSTRACT
End-stage renal disease requiring renal replacement therapy (RRT) during the neonatal period is a very rare condition, and little information is available regarding long-term RRT and outcomes. To gain more information, we performed a collaborative study on patient characteristics and treatment outcomes in children who started RRT as neonates during their first month of life between 2000 and 2011 who were prospectively registered in the ESPN/ERA-EDTA, the IPPN (since 2007), the Japanese registry, or the Australian and New Zealand Dialysis and Transplant (ANZDATA) registry. During the first month of life, 264 patients from 32 countries started RRT and were followed for a median of 29 months (interquartile range 11–60 months). Most neonates (242) started on peritoneal dialysis, 21 started on hemodialysis, and 1 patient with a transplant. The most important causes of renal failure were congenital anomalies of the kidney and urinary tract in 141, cystic kidneys in 35, and cortical necrosis in 30. Within 2 years after the start of RRT, 69 children changed dialysis modality and 53 received a renal transplant. After a median of 7 months, 45 children had died, mainly because of infection, resulting in an estimated 2-year survival of 81%, and 5-year survival of 76%. Growth retardation (63%), anemia (55%), and hypertension (57%) were still major problems after 2 years. Thus, relatively good medium-term patient survival may be achieved with RRT started during the neonatal period, but specific therapeutic challenges continue to exist in this age group.

50. Mortality risk disparities in children receiving chronic renal replacement therapy for the treatment of end-stage renal disease across Europe: an ESPN-ERA/EDTA registry analysis
Chesnaye NC, Schaefer F, Bonthuis M et al.
Lancet 2017; 389: 2128–37.

ABSTRACT
BACKGROUND: We explored the variation in country mortality rates in the paediatric population receiving renal replacement therapy across Europe, and estimated how much of this variation could be explained by patient-level and country-level factors.
METHODS: In this registry analysis, we extracted patient data from the European Society for Paediatric Nephrology/European Renal Association-European Dialysis and Transplant Association (ESPN/ERA-EDTA) Registry for 32 European countries. We included incident patients younger than 19 years receiving renal replacement therapy. Adjusted hazard ratios (aHR) and the explained variation were modelled for patient-level and country-level factors with multilevel Cox regression. The primary outcome studied was all-cause mortality while on renal replacement therapy.
FINDINGS: Between Jan 1, 2000, and Dec 31, 2013, the overall 5 year renal replacement therapy mortality rate was 15·8 deaths per 1000 patient-years (IQR 6·4–16·4). France had a mortality rate (9·2) of more than 3 SDs better, and Russia (35·2), Poland (39·9), Romania (47·4), and Bulgaria (68·6) had mortality rates more than 3 SDs worse than the European average. Public health expenditure was inversely associated with mortality risk (per SD increase, aHR 0·69, 95% CI 0·52–0·91) and explained 67% of the variation in renal replacement therapy mortality rates between countries. Child mortality rates showed a significant association with renal replacement therapy mortality, albeit mediated by macroeconomics (eg, neonatal mortality reduced from 1·31 [95% CI 1·13–1·53], p=0·0005, to 1·21 [0·97–1·51], p=0·10). After accounting for country distributions of patient age, the variation in renal replacement therapy mortality rates between countries increased by 21%.
INTERPRETATION: Substantial international variation exists in paediatric renal replacement therapy mortality rates across Europe, most of which was explained by disparities in public health expenditure, which seems to limit the availability and quality of paediatric renal care. Differences between countries in their ability to accept and treat the youngest patients, who are the most complex and costly to treat, form an important source of disparity within this population.
Our findings can be used by policy makers and health-care providers to explore potential trategies to help reduce these health disparities.

51. Transplantation of adult-size kidneys in small pediatric recipients: A single-center experience
Muramatsu M, Mizutani T, Hamasaki Y et al.
Pediatric Transplantation. 2019;e13401.

ABSTRACT
RTx of adult-size kidneys presents a size mismatch in small pediatric recipients, and there are potential surgical complications. This study reveals the outcomes of intra and extraperitoneal RTx in low-weight (less than 15 kg) pediatric recipients. We studied 51 pediatric patients weighing less than 15 kg who received a living-related donor renal transplant between 2009 and 2017. The intraperitoneal (group A, n = 24) and extraperitoneal (group B, n = 27) approaches were

compared. In group A, the mean age, Ht, and weight were 3.8 ± 1.6 years, 83.7 ± 6.5 cm, 10.5 ± 1.8 kg; in group B, 5.0 ± 1.9 years, 95.3 ± 7.3 cm, and 13.0 ± 1.4 kg. Single renal artery grafts (21 in group A and 16 in group B) and double renal artery grafts (three in group A and 11 in group B) were performed. Of the patients with double renal artery transplants, one in group A and six in group B underwent ex vivo arterial reconstruction. The eGFR (mL/min/1.73 m^2) at 1-week post-transplant in group A was significantly higher than that in group B; the eGFRs at 4 weeks post-transplant did not differ. One graft was lost in group B because of vascular thrombosis. Post-transplant complications included ileus and transplant ureteral stenosis. There was no significant difference in 5-year graft survival rate (group A 100%, group B 91.7%). Both transplant approaches are feasible to adapt to a size mismatch between the adult-size donor kidney and low-weight pediatric recipients.

52. Survival and transplantation outcomes of children less than 2 years of age with end-stage renal disease

Alexander RT, Foster BJ, Tonelli MA et al.
Pediatr Nephrol (2012) 27:1975–1983.

ABSTRACT
BACKGROUND: Young children with end-stage renal disease (ESRD) requiring renal replacement therapy (RRT) have traditionally experienced high rates of morbidity and mortality; however, detailed long-term follow-up data is limited.
METHODS: Using a population-based retrospective cohort with data from a national organ failure registry and administrative data from Canada's universal health care system, we analysed the outcomes of 87 children starting RRT (before age 2 years) and followed them until death or date of last contact [median follow-up 4.7 years, interquartile range (IQR) 1.4–9.8). We assessed secular trends in survival and the influence of: (1) age at start of RRT and (2) etiology of ESRD with survival and time to transplantation.
RESULTS: Patients were mostly male (69.0 %) with ESRD predominantly due to renal malformations (54.0 %). Peritoneal dialysis was the most common initial RRT (83.9 %). Fiftyseven (65.5 %) children received a renal transplant (median age at first transplant: 2.7 years, IQR 2.0–3.3). During 490 patient-years of follow-up, there were 23 (26.4 %) deaths, of which 22 occurred in patients who had not received a transplant. Mortality was greater for patients commencing dialysis between 1992 and 1999 and among the youngest children starting RRT (0–3 months). Children with ESRD secondary to renal malformations had better survival than those with ESRD due to other causes. Among the transplanted patients, all but one survived to the end of the observation period.
CONCLUSION: Children who start RRT before 3 months of age have a high risk of mortality. Among our paediatric patient cohort, mortality rates were much lower among children who had received a renal transplant.

53. Identification of subgroups by risk of graft failure after paediatric renal transplantation: Application of survival...

Lofaro D, Jager KJ, Abu-Hanna A et al.
Nephrol Dial Transplant (2016) 31: 317–324.

ABSTRACT

BACKGROUND: Identification of patient groups by risk of renal graft loss might be helpful for accurate patient counselling and clinical decision-making. Survival tree models are an alternative statistical approach to identify subgroups, offering cut-off points for covariates and an easy-to-interpret representation.

METHODS: Within the European Society of Pediatric Nephrology/ European Renal Association-European Dialysis and Transplant Association (ESPN/ERA-EDTA) Registry data we identified paediatric patient groups with specific profiles for 5-year renal graft survival. Two analyses were performed, including (i) parameters known at time of transplantation and (ii) additional clinical measurements obtained early after transplantation. The identified subgroups were added as covariates in two survival models. The prognostic performance of the models was tested and compared with conventional Cox regression analyses.

RESULTS: The first analysis included 5275 paediatric renal transplants. The best 5-year graft survival (90.4%) was found among patients who received a renal graft as a pre-emptive transplantation or after short-term dialysis (<45 days), whereas graft survival was poorest (51.7%) in adolescents transplanted after long-term dialysis (>2.2 years). The Cox model including both pre-transplant factors and tree subgroups had a significantly better predictive performance than conventional Cox regression ($P < 0.001$). In the analysis including clinical factors, graft survival ranged from 97.3% [younger patients with estimated glomerular filtration rate (eGFR) >30 mL/min/1.73 m^2 and dialysis <20 months] to 34.7% (adolescents with eGFR <60 mL/min/1.73 m^2 and dialysis >20 months). Also in this case combining tree findings and clinical factors improved the predictive performance as compared with conventional Cox model models ($P < 0.0001$).

CONCLUSIONS: In conclusion, we demonstrated the tree model to be an accurate and attractive tool to predict graft failure for patients with specific characteristics. This may aid the evaluation of individual graft prognosis and thereby the design of measures to improve graft survival in the poor prognosis groups.

54. Kidney Transplantation in Children

Dharnidharka VR, Fiorina P and Harmon E.

N Engl J Med 2014;371:549-58.

ABSTRACT

Since the first successful kidney transplantation in 1954,1 kidney transplantation has become the best treatment for adult patients with kidney failure. However, early pediatric kidney transplantation was complicated by technical, immunologic, and logistic problems, all leading to worse patient and graft survival among children than had been observed among adults. Over the past 15 years, a number of advances have greatly improved patient and graft survival among children with kidney transplants.[2,3]

Some aspects of clinical kidney transplantation are similar in children and adults. The immunosuppressive medications and regimens used are similar, creatinine is the major serum biomarker, acute rejection is determined primarily by means of biopsy with the use of the Banff criteria for the classification of rejection (Table S1 in the Supplementary Appendix, available with the full text of this article at NEJM.org), and the rejection mechanisms of the kidney graft are generally similar.[4-7]

However, many other aspects differ between children and adults — immunologic factors, the primary kidney diseases leading to kidney failure, often with associated urologic issues, and the

immunizations that are required before transplantation. Allocation policies regarding kidneys from deceased donors, surgical techniques in small children, and drug metabolism have distinctive aspects in children. The frequency of primary viral infection after transplantation is higher for children than for adults. Furthermore, children are developing so their linear-height growth needs to be optimized and their neurocognitive development fostered. Ultimately, the child with a transplant must be readied for the transition to adult care. This review considers the differences between children and adults undergoing kidney transplantation that necessitate alternative approaches in children and have resulted in innovations and important advances.

55. Kidney transplant results in children: progress made, but blacks lag behind
Dharnidharka VR and Seifert ME.
Kidney Int. 2015 March ; 87(3): 492–494.

ABSTRACT
Early kidney transplant results in children lagged behind corresponding results in adults. Multiple advances over the last three decades have eliminated that gap. Most children now have equal or superior long-term allograft and patient survival compared to adult recipients. However, black children in the USA continue to have comparatively inferior allograft survival results to non-black children, even after extensive adjustments for socioeconomic status and access to transplantation.

56. Impact of the kidney allocation system on young pediatric recipients
Parker WF, Ross LF, Richard Thistlethwaite J Jr et al.
Clin Transplant. 2018 April ; 32(4): e13223.

ABSTRACT
The kidney allocation system (KAS) altered pediatric candidate prioritization. We determined KAS's impact on pediatric kidney recipients by examining delayed graft function (DGF) rates from 2010 to 2016. A propensity score-matched pediatric recipients pre- and post-KAS. A semiparametric decomposition analysis estimated the contributions of KAS-related changes in donor characteristics and dialysis time on DGF rate. The unadjusted odds of DGF were 69% higher post-KAS for young (<10 years at listing) recipients (N = 1153, P = .02) but were not significantly increased for older pediatric (10-17 years at listing) recipients (N = 2624, P = .48). Post-KAS, young recipients received significantly fewer pediatric (<18 years) donor kidneys (21% vs 32%, P < .01) and had longer median pretransplant dialysis time (603 vs 435 days, P < .01). After propensity score matching, post-KAS status increased the odds of DGF in young recipients 71% (OR 1.71, 95% CI 1.01-2.46). In decomposition analysis, 24% of the higher DGF rate post-KAS was attributable to donor characteristics and 19% to increased recipient dialysis time. In a confirmatory survival analysis, DGF was associated with a 2.2 times higher risk of graft failure (aHR2.28, 95% CI 1.46-3.54). In conclusion, KAS may lead to worse graft survival outcomes in children. Allocation changes should be considered.

57. Pediatric renal transplantation with considerations for successful outcomes
Salvatierra O Jr, Millan M, Concepcion W.
Semin Pediatr Surg. 2006 Aug;15(3):208-17.

ABSTRACT
Renal transplantation in the pediatric population, although conceptually similar to that in adults, differs in many aspects. This review will focus on the issues unique to the pediatric recipient. In particular, we will focus on the incidence and etiology of end stage renal disease in children, and the results as measured by patient and graft survival. Pretransplant surgical considerations of timing of the transplant, management of congenital urologic abnormalities and the abnormal bladder will be addressed. Etiologies of renal failure unique to the pediatric population will be discussed, including autosomal recessive polycystic kidney disease, congenital nephrotic syndrome, inferior vena cava thrombosis, and primary hyperoxaluria Type 1. Lastly, special transplant surgical considerations including transplantation of an adult-size kidney (ASK) into an infant or small child and ureteral implantation, management of the urinary bladder, and fluid management in infants and small children will be discussed.

58. Intraoperative hemodynamic factors predicting early postoperative renal function in pediatric kidney transplantation

Michelet D, Brasher C, Marsac L et al.

Pediatric Anesthesia. 2017;27:927–934.

ABSTRACT
BACKGROUND: The anesthetic management of kidney transplantation in children remains somewhat empirical. The goal of the present study was to investigate intraoperative hemodynamic factors affecting posttransplantation kidney function.
METHODS: We performed a retrospective analysis of data from patients undergoing kidney transplantation in our pediatric teaching hospital from 2000 to 2014. Data collected included: donor and recipient demographic data, recipient comorbidities, fluids administered intraoperatively, and intraoperative blood pressure and central venous pressure. The main outcome of the study was the creatinine clearance at day 1 corrected to a body surface area of 1.73 m^2. Analysis was performed using Classification Tree Analysis with 10-fold cross-validation.
RESULTS: One hundred and two patients were included. The following predictors of increased postoperative creatinine clearance at day 1 were identified: decreasing recipient weight, mean blood pressure-to-weight ratio 10 minutes after reperfusion, reduced cold ischemia duration, and increased intraoperative albumin infusion. Increased creatinine clearance was observed when mean blood pressure-to-weight ratio 10 minutes after reperfusion was ≥4.3 in patients weighing 13-21 kg and ≥2.5 in those ≥22 kg. Overall, the model explained 64% (and at cross-validation 60%) of creatinine clearance variability at day 1.
CONCLUSION: Intraoperative hemodynamics during kidney transplantation should be optimized in order to increase mean blood pressure according to values indicated by our analyses. Cold ischemia duration should be shortened as far as possible.

6. RECEPTOR MARGINAL

COMPLICACIONES VASCULARES

59. Insights in Transplanting Complex Paediatric Renal Recipients With Vascular Anomalies
Chandak P, Kessaris N, Callaghan CJ, et al.
Transplantation. 2017 Oct;101(10):2562-2570

ABSTRACT
BACKGROUND: Children with end-stage kidney disease may have co-existing iatrogenic or congenital vascular anomalies making transplantation difficult. We describe our approach in 5 recipients with vascular anomalies and significant co-morbidities, including one case of blood group incompatibility.
METHODS: Five children aged 3 - 17 (median 7) years, weighing 14 - 34 (median 18) kg of whom 4 had occluded inferior vena cava or iliac veins and 2 had previous complex vascular reconstructions prior to transplantation for mid-aortic syndrome and multiple aortic aneurysms, respectively underwent renal transplantation. In order to establish implant feasibility surgery was commenced in 2 recipients prior to the donor surgery.
RESULTS: There was 4/5 (80 %) patient survival following one death from sepsis (with a functioning graft) and 2 cases of delayed graft function. At the latest median follow-up of 19 months there was 100 % (death censored) renal allograft survival with estimated glomerular filtration rates (eGFR mls/min/1.73m2) of 43 - 72 (median 55).
CONCLUSIONS: We conclude that major vascular anomalies do not necessarily preclude transplantation in complex paediatric patients and that surgical exploration of the recipient prior to commencing the donor surgery is valuable where feasibility and safety are uncertain. In addition, we have developed a novel classification system of congenital vascular abnormalities and propose its use in complex paediatric transplantation.

60. Renal Transplantation With Size-Matched End-to-End Venous Anastomosis in Children With Inferior Vena Cava Thrombosis
Dinckan A, Aliosmanoglu I, Akmanb S, et al.
Transplantation Proceedings, 47, 1345e1347 (2015)

ABSTRACT
Due to surgical technical difficulties, inferior vena cava (VCI) thrombosis is contraindicated for renal transplantation in pediatric patients. Of 287 pediatric renal transplantations, 3 patients (9, 12, and 19 kg, respectively) with end-stage renal failure, who had VCI thrombosis at the level of renal vein, underwent end-to-end anastomosis to the proximal aspect of VCI for venous drainage. The latest creatinine values of the patients, who were in the postoperative 56^{th}, 28^{th}, and 14^{th} months, were 0.6, 0.4, and 0.3 mg/dL, respectively, with graft and patient survival rates of 100%. We think that end-to-end venous drainage into the proximal caval system is the most appropriate surgical approach in pediatric recipients, who have an open suprarenal VCI and a small intra-abdominal cavity, in the presence of an appropriate size-matched graft.

61. Successful Renal Transplantation in Small Children With a Completely Thrombosed Inferior Vena Cava

Verghese P, Minja E, Kirchner V, et al.

American Journal of Transplantation 2017; 17: 1670–1673

ABSTRACT

In small children with end-stage renal disease, an adult-sized kidney transplant is the best option. However, in the face of a completely thrombosed inferior vena cava (IVC), such transplants can be challenging, given the difficulty of achieving adequate renal venous outflow and the risk of graft thrombosis. Using a new technique to anastomose the renal vein to the right hepatic vein/IVC junction, we successfully implanted an adult-sized graft in two small children (9.8 and 14 kg) who had endstage renal disease and a completely thrombosed IVC. After mobilizing the right lobe of the liver and obtaining total vascular occlusion of the liver, we used a Fogarty catheter to dilate the retrohepatic IVC. In the right hepatic vein, we made a venotomy and extended it inferiorly onto the retrohepatic IVC. To that venotomy, we anastomosed the donor left renal vein, using continuous 7-0 Prolene sutures. Both patients attained excellent renal allograft function: One had a serum creatinine level of 0.30 mg/dL at 6 mo after transplant, and the other had a level of 0.29 mg/dL at 1 year. In these two small children with completely thrombosed IVC, our technique for transplanting an adult-sized kidney provided adequate venous outflow.

62. Successful third renal transplantation in a child with an occluded inferior vena cava: A novel technique to use the venous interposition between the transplant renal vein and the infrahepatic inferior vena cava

Muramatsu M, Shishido S, Takahashi Y, et al.

International Journal of Urology (2017) 24, 396—398

ABSTRACT

A girl aged 11 years and 3 months with occlusion of the inferior vena cava had experienced two renal transplant graft failures since birth. The third renal transplant from a live donor was carried out. Preoperative evaluation showed that the arteries from the right common to the right external iliac artery were absent, and the ilio-caval vein was occluded below the level of the renal vein. The donor's renal artery was anastomosed to the aorta. The donor's ovarian and large saphenous veins were used to extend the transplant renal vein to the recipient's patent inferior vena cava. The present report concludes that the extension of a short donor renal vein using other donor veins is a viable therapeutic option for pediatric patients with vascular occlusions.

COMPLICACIONES UROLÓGICAS

63. Urologic issues in pediatric transplant recipients

Torricelli FCM, Watanabe A, Piovesan AC et al.

Transl Androl Urol 2019;8(2):134-140

ABSTRACT

The limited supply of kidneys for pediatric transplantation leads to a large number of children in waiting transplant list. These patients have to be properly evaluated and prepared before organ

transplantation to increase its success. The aim of this review is focus on urologic issues of pediatric kidney transplants such as preoperative evaluation and urinary tract abnormalities correction, surgical technique, and postoperative complications. All children that are candidates for kidney transplantation should be submitted to abdominal ultrasound. If bladder dysfunction is suspected, a more detailed evaluation is mandatory, including a voiding cystourethrography and urodynamic study. Patients with a poor bladder capacity and compliance will require bladder augmentation. Whenever possible the native ureter is recommended for that. Regarding kidney transplantation, recipient surgery can be safely performed through an extraperitoneal access, even in children weighting less than 10 kilograms. It allows adequate access to iliac vessels, aorta and vena cava. Graft survival continued to improve over the past decade and it is around 80% in 5 years. Postoperative complications such as urinary fistula may occur in less than 5% of cases, while vascular complications are reported in 1% to 2% of cases.

64. Outcomes of kidney transplants in pediatric patients with the vertebral defects, anal atresia, cardiac defects, tracheoesophageal fistula, renal anomalies, limb abnormalities association
Diaz J, Chavers B Chinnakotla S, et al.
Pediatric Transplantation. 2018;e13341.

ABSTRACT
In this single-center retrospective study, we analyzed kidney transplant outcomes in nine pediatric patients with VACTERL [vertebral defects, anal atresia, cardiac defects, tracheoesophageal fistula, renal anomalies, limb abnormalities] association— making this the largest study of its kind. Of 743 pediatric kidney transplant recipients at our center (1980-2017), nine had documented diagnoses of VACTERL association. All nine had congenital anorectal malformations and renal anomalies, five had vertebral defects, and one had a bifid thumb and tracheoesophageal fistula. Renal anomalies included dysplasia (n = 6), aplasia (n = 3), and horseshoe kidney (n = 2). Congenital lower urinary tract anomalies included neurogenic bladder (n = 6), obstructive uropathy (n = 4), anovesicular fistula (n = 1), rectourethral fistula (n = 1), and posterior urethral valves (n = 1). Age at transplant ranged from 1.2 to 15 years (mean, 7.3; standard deviation [SD], 5.5); 6 (67%) were male, and 3 (33%) were female; 6 (67%) had a living related donor, and 3 (33%) had a deceased donor. The overall graft survival rate was 78% (range, 1.5 to 25.2 years; mean, 10.5; SD, 8.9). One month post-transplant, one recipient died with a functioning graft. At 3.7 years post-transplant, one graft failed because of recurrent pyelonephritis. Post-transplant urologic complications included pyelonephritis (n = 6), vesicoureteral reflux (n = 5), and graft hydronephrosis (n = 4).
We conclude that pediatric patients with VACTERL association can be safely transplanted—careful patient selection with vigilance and intervention for pre- and posttransplant urologic complications is essential.

65. Long-term outcome of pediatric renal transplantation in boys with posterior urethral valves
Hebenstreit D, Csaicsich D, Hebenstreit K, et al.
J Pediatr Surg. 2018 Nov;53(11):2256-2260.

ABSTRACT

PURPOSE: To determine whether there is a difference in the outcome of renal transplantation (RT) in patients with posterior urethral valves (PUV) and children with non-uropathy related end stage renal disease.
METHODS: Data were acquired retrospectively. We analyzed possible factors that influence the function of renal allografts and graft survival. Between 1995 and 2016 there were 149 RT. Out of them, there were 27 boys with PUV, who received 29 kidneys. Thirty patients, who received a total of 31 renal grafts due to a non-uropathic (NU) diagnosis, served as control group. Mean follow-up was 7.4 to 10.2 years.
RESULTS: There was no difference in estimated graft survival between patients with PUV and NU patients. Graft
failure occurred in 23.1% of PUV patients and 34.5% patients of the NU group. There was no statistically significant disparity in graft function between the two groups. Age at transplantation and donor age were the only factors that had a significant impact on renal function. There was a higher incidence of UTI in the PUV group (96%) than in the NU group (67%). Vesicostomy was the favourable intervention in regards of graft function.
CONCLUSIONS: RT in PUV patients is successful with the same outcome as in NU patients. Bladder dysfunction may not have a major impact on graft function and graft survival. It seems that the type of pre-transplant surgical procedures may influence outcome. Therefore, these interventions -if necessary- should be limited to a minimum.

DONANTES DE RIESGO

66. Pediatric Donor Management Goals in Use by US Organ Procurement Organizations
Ream RS, Clark MG, Armbrecht ES.
Prog Transplant. 2019 Jun;29(2):150-156.

ABSTRACT
INTRODUCTION: A recent study of pediatric organ donation after the neurologic determination of death (DNDD) demonstrated an association between the use of donor management goals (DMGs) by organ procurement organizations (OPOs) and organ yield.
Objective: To describe the pediatric DMGs used by OPOs and any association between specific DMGs and organ yield.
DESIGN: Query of US OPOs who utilized DMGs in the care of pediatric DNDD organ donors from 2010 to 2013.
RESULTS: All 23 OPOs using DMGs for pediatric DNDD organ donors during the study period participated (100%). The OPOs pursued an average 9.6 goals (standard deviation: 3.9; range: 5-22) with 113 unique definitions that targeted 33 aspects of donor hemodynamics, gas exchange/mechanical ventilation, electrolytes/renal function, blood products, thermoregulation, and infection control. The DMGs used by >50% of OPOs included blood pressure, oxygenation (partial pressure of arterial oxygen (PaO2), oxygen saturation of hemoglobin by pulse oximetry, or PaO2/fractional concentration of inspired oxygen [FiO2] ratio), pH, central venous pressure, serum sodium, urine output, limitations on inotropic support, and serum glucose. There was no significant correlation between the number of DMGs pursued by OPOs and organ yield. There was a difference in the observed/expected organs transplanted in the 0- to 10-year age-group for OPOs that included serum creatinine among their DMGs (P ¼ .046).
Conclusions: The pediatric

DMGs used by OPOs were generally measurable but diverse in definition and the number of goals pursued. There was no benefit in organ yield from larger DMG bundles. There may be a benefit in organ yield through the use of serum creatinine as a DMG in pediatric donors aged 0 to 10 years.

67. Kidney transplant outcomes associated with the use of increased risk donors in children
Kizilbash SJ, Rheault MN1, Wang Q et al.
Am J Transplant. 2019 Jun;19(6):1684-1692

ABSTRACT
Increased risk donors (IRDs) may inadvertently transmit blood-borne viruses to organ recipients through transplant. Rates of IRD kidney transplants in children and the associated outcomes are unknown. We used the Scientific Registry of Transplant Recipients to identify pediatric deceased donor kidney transplants that were performed in the United States between January 1, 2005 and December 31, 2015. We used the Cox regression analysis to compare patient and graft survival between IRD and non-IRD recipients, and a sequential Cox approach to evaluate survival benefit after IRD transplants compared with remaining on the waitlist and never accepting an IRD kidney. We studied 328 recipients with and 4850 without IRD transplants. The annual IRD transplant rates ranged from 3.4% to 13.2%. IRDs were more likely to be male (P = 0.04), black (P < 0.001), and die from head trauma (P = 0.006). IRD recipients had higher mean cPRA (0.085 vs 0.065, P = 0.02). After multivariate adjustment, patient survival after IRD transplants was significantly higher compared with remaining on the waitlist (adjusted hazard ratio [aHR]: 0.48, 95% CI: 0.26-0.88, P = 0.018); however, patient (aHR: 0.93, 95% CI: 0.54-1.59, P = 0.79) and graft survival (aHR: 0.89, 95% CI: 0.70-1.13, P = 0.32) were similar between IRD and non-IRD recipients. We recommend that IRDs be considered for transplant in children.

68. Use of genetic risks in pediatric organ transplantation listing decisions: A national survey
Graf M, Char D, Hanson-Kahn A, et al.
Pediatr Transplant. 2019 Jun;23(4):e13402

ABSTRACT
There is a limited supply of organs for all those who need them for survival. Thus, careful decisions must be made about who is listed for transplant. Studies show that manifesting genetic disease can impact listing eligibility. What has not yet been studied is the impact genetic risks for future disease have on a patient's chance to be listed. Surveys were emailed to 163 pediatric liver, heart, and kidney transplant programs across the United States to elicit views and experiences of key clinicians regarding each program's use of genetic risks (ie, predispositions, positive predictive testing) in listing decisions. Response rate was 42%. Sixty-four percent of programs have required genetic testing for specific indications prior to listing decisions. Sixteen percent have required it without specific indications, suggesting that genetic testing may be used to screen candidates. Six percent have chosen not to list patients with secondary findings or family histories of genetic conditions. In hypothetical scenarios, programs consider cancer predispositions and adult-onset neurological conditions to be relative contraindications to listing (61%, 17%, and 8% depending on scenario), and some consider them absolute contraindications (5% and 3% depending on scenario). Only 3% of programs have formal policies for these scenarios, but all consult genetic specialists at least “sometimes” for results interpretation. Our study reveals that pediatric

transplant programs are using future onset genetic risks in listing decisions. As genetic testing is increasingly adopted into pediatric medicine, further study is needed to prevent possible inappropriate use of genetic information from impacting listing eligibility.

69. A donor risk index for graft loss in pediatric living donor kidney transplantation
Wasik HL, Pruette CS, Ruebner RL, et al.
Am J Transplant. 2019 Mar 15.

ABSTRACT
Pediatric kidney transplant candidates often have multiple potential living donors (LDs); no evidence-based tool exists to compare potential LDs, or to decide between marginal LDs and deceased donor (DD) kidney transplantation (KT).
We developed a pediatric living kidney donor profile index (P-LKDPI) on the same scale as the DD KDPI by using Cox regression to model the risk of all-cause graft loss as a function of living donor characteristics and DD KDPI. HLA-B mismatch (adjusted hazard ratio [aHR] per mismatch = $_{1.04}$ 1.27$_{1.55}$), HLA-DR mismatch (aHR per mismatch = $_{1.02}$ 1.23$_{1.49}$), ABO incompatibility (aHR = $_{1.20}$ 3.26$_{8.81}$), donor systolic blood pressure (aHR per 10 mm Hg = $_{1.01}$1.07$_{1.18}$), and donor estimated GFR (eGFR; aHR per 10 mL/min/1.73 m^2 = $_{0.88}$ 0.94$_{0.99}$) were associated with graft loss after LDKT. Median (interquartile range [IQR]) P-LKDPI was -25 (-56 to 12). 68% of donors had P-LKDPI <0 (less risk than any DD kidney) and 25% of donors had P-LKDPI >14 (more risk than median DD kidney among pediatric KT recipients during the study period). Strata of LDKT recipients of kidneys with higher P-LKDPI had a higher cumulative incidence of graft loss (39% at 10 years for P-LDKPI ≥20, 28% for 20> P-LKDPI ≥-20, 23% for -20 > P-LKDPI ≥-60, 19% for P-LKDPI <-60 [log rank P < .001]). The P-LKDPI can aid in organ selection for pediatric KT recipients by allowing comparison of potential LD and DD kidneys.

TRASPLANTE Y CÁNCER

70. Pre-existing malignancies in renal transplant candidates—time to reconsider waiting times
Watschinger B, Budde K, Crespo M et al.
Nephrol Dial Transplant. 2019 Mar 4.

ABSTRACT
Current proposals for waiting times for a renal transplant after malignant disease may not be appropriate. New data on malignancies in end-stage renal disease and recent diagnostic and therapeutic options should lead us to reconsider our current practice.

71. Kidney transplantation in patients with previous renal cancer: a critical appraisal of current evidence and guidelines
Frascà GM, Brigante F, Volpe A et al.
J Nephrol. 2019 Feb;32(1):57-64.

ABSTRACT

Due to the increasing occurrence of renal cell carcinoma (RCC) in the general population and the high prevalence of chronic kidney disease among cancer patients, many people with a previous RCC may eventually require renal replacement therapy including kidney transplantation. They should accordingly be evaluated to assess their life expectancy and the risk that the chronic immunosuppressive therapy needed after grafting might impair their long-term outcome. Current guidelines on listing patients for renal transplantation suggest that no delay is required for subjects with small or incidentally discovered RCC, while the recommendations for patients who have been treated for a symptomatic RCC or for those with large or invasive tumours are conflicting. The controversial results reported by even recent studies focusing on the cancer risk in kidney graft recipients with a prior history of malignancy do not help to clarify the doubts arising in everyday clinical practice. Several tools, including integrated scoring systems, are currently available to assess the prognosis of patients with a previous RCC and, although they have not been validated in subjects receiving long-term immunosuppressive drugs, they can be used to identify patients suitable to be listed for grafting. Among these, the Leibovich score is currently the most widely used as it has proved simple and reliable enough and helps categorize renal transplant candidates. According to this system, subjects with a score from 0 to 2 are at low risk and may be listed without delay, while those with a score of 6 or higher should be excluded from grafting. In addition, other factors have an established positive prognostic value, including chromophobe or clear cell papillary tumour, or G1 grade cancer; on the contrary, medullary or Bellini's duct carcinoma or those with sarcomatoid dedifferentiation at histological examination should be excluded. All other patients would be better submitted to careful individual evaluation by an Oncologist before being listed for renal transplantation, pending studies specifically focusing on cancer risk evaluation in people already treated for malignancy receiving long-term immunosuppressive therapy.

VARIOS

72. New Nephrological Frontiers Opportunities and Challenges Created by Fetal Care Centers
Goebel J.
Adv Pediatr. 2017 Aug;64(1):73-86.

Abstract not available

73. Medical Contraindications to Transplant Listing in the USA: A Survey of Adult and Pediatric Heart, Kidney, Liver, and Lung Programs
Wall A, Lee GH, Maldonado J et al.
World J Surg. 2019 May 20.

ABSTRACT
INTRODUCTION: Listing practices for solid organ transplantation are variable across programs in the USA. To better characterize this variability, we performed a survey of psychosocial listing criteria for pediatric and adult heart, lung, liver, and kidney programs in the USA. In this manuscript, we report our results regarding listing practices with respect to obesity, advanced age, and HIV seropositivity.

METHODS: We performed an online, forced-choice survey of adult and pediatric heart, kidney, liver, and lung transplant programs in the USA.
RESULTS: Of 650 programs contacted, 343 submitted complete responses (response rate = 52.8%). Most programs have absolute contraindications to listing for BMI > 45 (adult: 67.5%; pediatric: 88.0%) and age > 80 (adult: 55.4%; pediatric: not relevant). Only 29.5% of adult programs and 25.7% of pediatric programs consider HIV seropositivity an absolute contraindication to listing. We found that there is variation in absolute contraindications to listing in adult programs among organ types for BMI > 45 (heart 89.8%, lung 92.3%, liver 49.1%, kidney 71.9%), age > 80 (heart 83.7%, lung 76.9%, liver 68.4%, kidney 29.2%), and HIV seropositivity (heart 30.6%, lung 59.0%, kidney 16.9%, liver 28.1%).
CONCLUSIONS: We argue that variability in listing enhances access to transplantation for potential recipients who have the ability to pursue workup at different centers by allowing different programs to have different risk thresholds. Programs should remain independent in listing practices, but because these practices differ, we recommend transparency in listing policies and informing patients of reasons for listing denial and alternative opportunities to seek listing at another program.

74. Renal Replacement Therapy in children with severe developmental disability: guiding questions for decision-making

Willem L, Knops N, Mekahli D et al.
Eur J Pediatr. 2018 Dec;177(12):1735-1743.

ABSTRACT
Whether to initiate or to withhold Renal Replacement Therapy (RRT) in children with severe developmental disability (DD) remains a topic of intense debate. The present study investigated the opinion of professionals on this difficult issue and proposed a checklist with guiding questions for decision-making. Clinicians affiliated to different organizations involved in pediatric nephrology worldwide were invited to respond to a web-based survey. This survey focused on the collection of demographic data of the respondents together with their opinion concerning the decision-making regarding RRT in a particular case and for children with severe DD in general. A total of 286 professionals responded to the survey. Sixty-six percent supported initiating RRT in the child of the case report, with pre-emptive transplantation being the preferred modality. Important arguments pro RRT initiation in children with severe DD in general were parental preference, decrease of suffering, and improvement of survival and quality of life. Important contraindications included low IQ, severe comorbidities, and inability of the patient to take medication or for the family to provide sufficient care.
CONCLUSION: The present study presents an inventory on the opinions of health care professionals involved in RRT in children regarding the treatment of children with DD and assists in the decision-making process by identifying important medical and psychosocial arguments for initiating or withholding RRT in severe DD patients.
What is Known: •Renal Replacement Therapy (RRT) in children with severe developmental disability (DD) is a topic of intense debate. •Previous studies on the opinion of professionals mainly focused on the use of IQ as an argument in the decision-making whether or not starting RRT.
What is New: •The present study investigated the opinion of professionals with regard to considering initiation or withholding RRT in children with severe DD and identified medical and

psychosocial arguments playing a role in the decision-making process. •Based on these arguments, a checklist with guiding questions for decision-making is proposed.

75. Outcomes of Pediatric Kidney Transplantation in Recipients of a Previous Non-Renal Solid Organ Transplant

Hamdani G1, Zhang B2, Liu C et al.

Am J Transplant. 2017 Jul;17(7):1928-1934.

ABSTRACT

Children who receive a non-renal solid organ transplant may develop secondary renal failure requiring kidney transplantation. We investigated outcomes of 165 pediatric kidney transplant recipients who previously received a heart, lung, or liver transplant using data from 1988 to 2012 reported to the United Network for Organ Sharing. Patient and allograft survival were compared with 330 matched primary kidney transplant (PKT) recipients. Kidney transplantation after solid organ transplant (KASOT) recipients experienced similar allograft survival: 5- and 10-year graft survival was 78% and 60% in KASOT recipients, compared to 80% and 61% in PKT recipients ($p = 0.69$). However, KASOT recipients demonstrated worse 10-year patient survival (75% KASOT vs. 97% PKT, $p < 0.001$). Competing risks analysis indicated that KASOT recipients more often experienced graft loss due to patient death ($p < 0.001$), whereas allograft failure per se was more common in PKT recipients ($p = 0.01$). To study more recent outcomes, kidney transplants performed from 2006 to 2012 were separately investigated. Since 2006, KASOT and PKT recipients had similar 5-year graft survival (82% KASOT vs. 83% PKT, $p = 0.48$), although 5-year patient survival of KASOT recipients remained inferior (90% KASOT vs. 98% PKT, $p < 0.001$). We conclude that despite decreased patient survival, kidney allograft outcomes in pediatric KASOT recipients are comparable to those of PKT recipients.

76. Early transplantation into a vesicostomy: a safe approach for managing patients with severe obstructive lesions who are not candidates for bladder augmentation

Viswanathan A, Leffler T, Paloian N et al.

Am J Transplant. 2017 Jul;17(7):1928-1934.

ABSTRACT

INTRODUCTION: Management of severe antenatally detected oligohydramnios with and without obstruction is improving with the result that more fetuses are surviving with early renal failure. Significant advances have occurred in all specialties involved in the management of these patients. All these specialties working together have resulted in the survival of more patients born with renal failure.

OBJECTIVE: The aim of this study is to highlight the medical advances in antenatal management of fetal oligohydramnios and pulmonary hypoplasia and to demonstrate that transplantation into a diverted urinary system is safe and leads to good outcomes.

STUDY DESIGN: A case series of five patients were presented who, at the study center's respective facilities, recently underwent renal transplantation into bladders drained by cutaneous vesicostomy after extensive bladder evaluation and whose clinical cases highlight the aim of this study.

RESULTS: A total of 5 patients were reviewed. Renal failure was caused by posterior urethral valves in four patients, and in one patient Eagle-Barrett syndrome. One patient received an amnio-infusion and attempted antenatal bladder shunt. One patient was ventilator dependent until 24 months, and required a tracheostomy, while two patients were ventilator dependent for the first few months of life. Three of five patients were dialysis dependent. Patient age at transplantation ranged from 20 to 61 months. All patients were poorly compliant pre-transplant and had bladder capacities ranging from 10 mL to 72 mL. Months since follow-up ranged from 3 to 64 months. Creatinine levels prior to transplant ranged from 1.9 to 5.6. During the follow up period, this range decreased to 0.13 to 0.53. Two of five patients had UTI episodes since transplantation. Patient A showed Banff Type 1A acute T-cell mediated rejected approximately two months after transplant, but subsequent biopsies have been negative for rejection. Patient A also required a vesicostomy revision approximately two months after transplant and balloon dilation of UVJ anastomosis three months after transplant.
DISCUSSION: Vesicostomy is an especially attractive option to manage children with small bladders to accommodate the high urinary output that occurs after transplantation in infants who require an adult kidney. Recent advances in antenatal management such as amnioinfusion for oligohydramnios have made significant impacts in pulmonary and renal management of this patient population over recent years.
CONCLUSION: This report provides further support for the use of vesicostomy as an option for surgical management of patients with renal failure with oligohydramnios and severe obstructive lesions identified antenatally. It also indicates the need to update the criteria for antenatal management of oligohydramnios in obstructive and anephric patients.