Natural Resources for Human Health
eISSN: 2583-1194

Original Research

Received 25 July 2026
Revised 27 Aug 2026
Accepted 15 Sep 2026

Natural Resources for Human Health 2026, Vol. 6 (22s): 1107–1114

KEYWORDS:
pediatric kidney transplantation; living-related donor; end-stage kidney disease; computed tomography angiography; graft survival; Central Asia; Uzbekistan

Establishing a Pediatric Living-Related-Donor Kidney Transplantation Program in Uzbekistan: A Five-Year Single-Center Cohort Study

Pediatric Kidney Transplantation in Uzbekistan

Fazlitdin Sh. Bakhritdinov[1], Zokhitjon T. Matkarimov[1,2], Jasur B. Urinov[1], Nigina B. Elmurodova[1], Dilshoda Akramova[3]*

[1]Republican Specialized Scientific-Practical Medical Center of Surgery named after Academician V. Vakhidov, Tashkent, Uzbekistan
[2]Tashkent State Medical University, Tashkent, Uzbekistan
[3]Department of Neurology and Medical Psychology, Tashkent State Medical University, Tashkent, Uzbekistan
ORCID
Fazlitdin Sh. Bakhritdinov 0009-0004-8393-1237; Zokhitjon T. Matkarimov 0009-0008-2594-8195; Jasur B. Urinov 0009-0000-8192-0260; Nigina B. Elmurodova 0009-0008-9954-0280; Dilshoda Akramova 0000-0001-9495-3213
*Corresponding author: Dilshoda Akramova,
Department of Neurology and Medical Psychology, Tashkent State Medical University, 2 Farabi Street, Olmazor District, Tashkent 100109, Uzbekistan. E-mail: dilshoda-akramova@mail.ru

ABSTRACT: **Background**: Kidney transplantation is the optimal treatment for children with end-stage kidney disease, yet outcome data from Central Asia are lacking. We describe the first 5 years of a pediatric living-related-donor (LRD) kidney transplantation program in Uzbekistan and evaluate its feasibility, donor structure, geographic reach, and clinical results.

Methods: This prospective single-center cohort study included 52 recipients aged 5–17 years who underwent elective LRD kidney transplantation at a national referral center in Tashkent in 2020–2025. Donors were selected through a four-stage protocol culminating in multislice computed tomography (MSCT) angiography. Outcomes included intraoperative parameters, Schwartz-estimated glomerular filtration rate (eGFR), and Kaplan–Meier patient and graft survival.

Results: Mean recipient age was 14.2 ± 0.42 years; 86.5% received maintenance hemodialysis and 13.5% underwent preemptive transplantation. Parents provided 76.9% of kidneys (mothers 46.2%). Seventy-five percent of recipients lived outside the capital area. MSCT angiography identified vascular variants in 25% of donors. Mean cold ischemia time was 42.5 ± 1.8 min, and diuresis resumed within 10 min of reperfusion in every recipient. Mean eGFR was 96.3 ± 4.4 mL/min/1.73 m2 at discharge and 85.4 ± 4.8 mL/min/1.73 m2 at 12 months. Patient survival was 100% at 1 year and 98.1% at 5 years; graft survival was 100% and 94.2%. No Clavien–Dindo grade ≥ IIIb complications or donor adverse events occurred.

Natural Resources for Human Health
eISSN: 2583-1194

Conclusions: Pediatric LRD kidney transplantation is feasible in Uzbekistan, with early and mid-term outcomes comparable with international registries. Regional scaling through a hub-and-spoke model and multicenter studies with longer follow-up are the next priorities.

Abbreviations: CAKUT, congenital anomalies of the kidney and urinary tract; CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; ESKD, end-stage kidney disease; ESPN/ERA-EDTA, European Society for Paediatric Nephrology/European Renal Association–European Dialysis and Transplant Association; HLA, human leukocyte antigen; IQR, interquartile range; LRD, living-related donor; M ± SE, mean ± standard error; MSCT, multislice computed tomography; OPTN/UNOS, Organ Procurement and Transplantation Network/United Network for Organ Sharing; PRA, panel-reactive antibody.

1. INTRODUCTION

For children with end-stage kidney disease (ESKD), kidney transplantation is superior to both hemodialysis and peritoneal dialysis in terms of survival, growth, neurocognitive development, and quality of life.[1–4] Registry data from Europe and North America show 5-year patient survival above 94% and stable outcomes over the last decade,[1,5] and mature single-center programs report similar figures.[6–9]

The pediatric ESKD population differs fundamentally from adults. Congenital anomalies of the kidney and urinary tract (CAKUT) account for 40–50% of cases,[10,11] whereas diabetic, hypertensive, and glomerular disease dominate in adults.[12] These differences impose distinct organizational requirements on any center that undertakes pediatric transplantation.[13,14]

Living-related donation is particularly attractive for children. It shortens waiting time, minimizes cold ischemia, allows planned preparation and optimal immunological matching, and improves long-term graft survival.[15–18] It also makes preemptive transplantation possible, with its benefits for physical and psychosocial development.[19,20] These advantages depend on rigorous donor evaluation that combines modern imaging, functional assessment, and long-term risk projection.[21–26]

Uzbekistan created the legal basis for organ transplantation with Law No. ZRU-768 "On the transplantation of human organs and tissues" (2022), and the Development Strategy of New Uzbekistan designated transplantology as a priority for specialized care. Comparable programs in the post-Soviet region have been built at leading centers in Russia and Belarus.[7–9,27,28] The Republican Specialized Scientific-Practical Medical Center of Surgery named after Academician V. Vakhidov (hereafter, the Vakhidov Center) was among the first Uzbek institutions to systematically implement pediatric kidney transplantation.

Evidence on donor availability, regional accessibility, and early outcomes of pediatric transplantation in low- and middle-income settings remains scarce,[6,14,29] and no such data have been published for Central Asia. The aim of this study was to assess the feasibility of a pediatric living-related-donor (LRD) kidney transplantation program in Uzbekistan through the clinical and demographic profile of recipients and donors, the geographic reach of the service, and short- and mid-term clinical outcomes.

2. MATERIALS AND METHODS

2.1. Design, setting, and participants

We conducted a prospective, single-center cohort study at the Department of Kidney Transplantation and Rehabilitation of the Vakhidov Center (Tashkent, Uzbekistan). Consecutive pediatric recipients transplanted between January 2020 and December 2025 were screened.

Inclusion criteria were (1) age 5–17 years; (2) elective kidney transplantation from a living related donor; and (3) complete preoperative and postoperative clinical and imaging records. Exclusion criteria were (1) deceased-donor transplantation; (2) repeat transplantation; (3) high immunological risk (panel-reactive antibodies > 20%); and (4) refusal by the legal representative. Fifty-two recipients met these criteria.

All patients were managed by a multidisciplinary team of transplant surgeons, pediatric nephrologists, anesthesiologists, intensivists, and radiologists.

2.2. Ethics

The study followed the Declaration of Helsinki and was approved by the Ethics Committee of the Vakhidov Center (Protocol No. 342.12.76). Written informed consent was obtained from all donors and from the parents or legal guardians of all recipients; age-appropriate assent was obtained from recipients. Voluntariness of donation was verified under Law No. ZRU-768.

2.3. Donor selection

Donors passed a four-stage protocol.

Stage 1 — Medical, psychological, and legal screening: age 18–65 years, voluntary decision, absence of financial motivation, legal capacity.

Stage 2 — Immunological compatibility: ABO and Rh typing, human leukocyte antigen (HLA) typing, cross-match, and detection of preformed donor-specific antibodies.

Stage 3 — In-depth medical evaluation: hematology and biochemistry, creatinine clearance and 24-h proteinuria, screening for HIV, hepatitis B and C, tuberculosis, and syphilis, cancer and endocrine screening, electrocardiography, and echocardiography. The minimum estimated glomerular filtration rate (eGFR) for acceptance was 80 mL/min/1.73 m^2 without significant proteinuria.

Stage 4 — Imaging: multislice computed tomography (MSCT) angiography on 128-slice or 640-slice scanners with three-dimensional reconstruction of the renal vascular pedicle, recording the number, caliber, and course of arteries and veins, accessory vessels, and pelvicalyceal and ureteral anatomy. The side of nephrectomy and the surgical plan were determined from these findings.

2.4. Recipient preparation

Preparation comprised correction of fluid–electrolyte disturbances and hypertension, nutritional optimization, treatment of anemia, eradication of dental, ENT, and urological infection foci, virological screening (cytomegalovirus, Epstein–Barr virus, hepatitis viruses, HIV), and immunological matching. Preemptive transplantation was planned whenever possible; otherwise, recipients were maintained on stable hemodialysis until surgery.

2.5. Surgery and immunosuppression

All operations were performed electively by one surgical team using a standardized technique: extraperitoneal heterotopic placement in the right or left iliac fossa with end-to-side anastomoses to the external or common iliac artery and vein. Donor nephrectomy and implantation were performed simultaneously in adjacent operating rooms. Induction consisted of basiliximab and methylprednisolone; maintenance therapy was tacrolimus, mycophenolate mofetil, and prednisolone.

2.6. Follow-up and outcomes

Minimum follow-up was 12 months, with continued outpatient surveillance at the center. Outcome variables were recipient and donor demographics, donor kinship, recipient region of residence, pretransplant renal replacement therapy, comorbidities, MSCT anatomy, intraoperative parameters (cold and second warm ischemia times, operative duration, blood loss, time to diuresis), serum creatinine and Schwartz eGFR at discharge and 12 months, surgical complications (Clavien–Dindo classification), and Kaplan–Meier patient and graft survival. Graft loss was defined as return to dialysis; graft survival was not censored for death.

2.7. Statistical analysis

Analyses were performed with SPSS Statistics v.19.0 (IBM Corp., Armonk, NY, USA). Normality was assessed with the Shapiro–Wilk test. Normally distributed variables are reported as mean ± standard error (M ± SE), others as median (interquartile range, IQR). Comparisons used Student's *t*-test or the Mann–Whitney test for continuous variables and Pearson's chi-square or Fisher's exact test for categorical variables. Survival was estimated by the Kaplan–Meier method. Significance was set at $p < 0.05$.

3. RESULTS

3.1. Recipients

The 52 recipients (25 boys, 48.1%; 27 girls, 51.9%) had a mean age of 14.2 ± 0.42 years (range 5–17), mean weight 38.4 ± 1.5 kg, height 148.4 ± 1.9 cm, and body mass index 17.1 ± 0.45 kg/m^2. Comorbidity was near-universal (Figure 1): anemia in all 52 (100%), arterial hypertension in 51 (98.1%), dyspnea in 45 (86.5%), oliguria/anuria in 31 (59.6%), reduced left ventricular ejection fraction in 12 (23.1%), hyperkalemia in 11 (21.2%), and viral hepatitis B or C in 4 (7.7%). Forty-five children (86.5%) were on maintenance hemodialysis for a median of 14 months (IQR 8–24), and 7 (13.5%) were transplanted preemptively.

3.2. Donors

Parents donated in 40 cases (76.9%): mothers in 24 (46.2%) and fathers in 16 (30.8%). Other donors were uncles (n = 5, 9.6%), brothers (n = 4, 7.7%), aunts (n = 2, 3.8%), and one grandfather (1.9%) (Figure 2). Donors comprised 24 men (46.2%) and 28 women (53.8%); mean weight was 74.2 ± 2.1 kg and mean eGFR 97.6 ± 8.4 mL/min/1.73 m^2. Mean age was 40.5 ± 1.3 years for mothers, 42.8 ± 1.5 years for fathers, 45.0 ± 2.2 years for uncles and aunts, and 25.5 ± 2.8 years for brothers; the grandfather was 62 years old with fully preserved renal function (Figure 4). Every evaluated donor completed the protocol and was deemed suitable; no donor experienced a perioperative complication.

3.3. Geographic distribution

Recipients originated from 13 administrative units of Uzbekistan and one from the Kyrgyz Republic (Figure 3). The largest contributors were Tashkent region (n = 8, 15.4%), Kashkadarya and Fergana regions (n = 6 each, 11.5%), followed by Tashkent city, Khorezm, and Namangan (n = 5 each, 9.6%), Andijan (n = 4, 7.7%), and Samarkand and Surkhandarya (n = 3 each, 5.8%). Karakalpakstan, Jizzakh, Bukhara, and Navoi contributed single cases. The capital area (Tashkent city plus Tashkent region) accounted for 13 recipients (25.0%); the remaining 75% traveled from other regions.

3.4. Donor vascular anatomy

Standard anatomy (single artery and vein) was present in 39 donors (75.0%). Variants were found in 13 (25.0%): accessory renal artery in 8 (15.4%), early arterial bifurcation in 3 (5.8%), and venous anomalies (duplicated renal vein, retroaortic right renal vein) in 2 (3.8%) (Figure 5). None contraindicated donation; all were incorporated into surgical planning.

3.5. Intraoperative parameters

Key parameters are summarized in Table 1. Cold ischemia time never exceeded 60 min, and spontaneous diuresis resumed within 10 min of reperfusion in all 52 recipients. No Clavien–Dindo grade IIIb or higher complication occurred.

3.6. Graft function and survival

Mean serum creatinine at discharge was 64.7 ± 3.1 μmol/L. Schwartz eGFR was 96.3 ± 4.4 mL/min/1.73 m^2 at discharge and 85.4 ± 4.8 mL/min/1.73 m^2 at 12 months.

Kaplan–Meier patient survival was 100% at 12 months and 98.1% at 5 years; graft survival was 100% and 94.2%, respectively (Figure 6). One recipient died at month 14 from a cause unrelated to the graft, and two grafts were lost at months 20 and 24 with return to hemodialysis.

4. DISCUSSION

This is the first report of a pediatric LRD kidney transplantation program from Central Asia. Within 5 years of its launch, a single national center transplanted 52 children from nearly every region of Uzbekistan and one neighboring country, with no severe surgical complications, no donor morbidity, and 5-year patient and graft survival of 98.1% and 94.2%.

4.1. Outcomes in the international context

Our survival figures match or exceed pooled registry data. The ESPN/ERA-EDTA Registry reports 5-year patient and graft survival of 96.8% and 87.4%,[5] and OPTN/UNOS reports 97.5% and 88.2% for living-donor pediatric recipients.[4] Several factors likely explain our favorable results: exclusive use of living related donors with elective preparation, high-quality HLA matching (especially maternal), a single surgical team, and a uniform immunosuppressive protocol. Two features deserve emphasis. First, simultaneous surgery in adjacent operating rooms kept cold ischemia below 1 h in every case, which is associated

with immediate graft function. Second, universal preoperative MSCT angiography revealed vascular variants in one in four donors and allowed nephrectomy and implantation to be planned in advance rather than improvised.[21] The uniform resumption of diuresis within 10 min of reperfusion probably reflects both factors.

4.2. Structure of the donor pool

Mothers provided nearly half of the grafts, consistent with the 40–55% reported in large series from the United States, Europe, and Asia.[18,29] This pattern combines biological advantages (maternal HLA sharing) with sociocultural ones.[26] The lower share of fathers likely reflects a higher prevalence of hypertension, hyperglycemia, and smoking among working-age men, leading to more frequent medical exclusion. The overall parental contribution of 76.9% exceeds that of Western European programs (55–65%)[18] and resembles that of Middle Eastern and South Asian programs (75–85%),[6] indicating strong intrafamilial solidarity and a stable donor resource on which the program can grow.

4.3. Regional accessibility and scaling

Three-quarters of recipients came from outside the capital area, demonstrating nationwide demand but also the continued dependence of regional families on a single center. International experience supports hub-and-spoke organization, in which regional nephrology units handle pretransplant preparation and routine follow-up while the reference center performs surgery and scheduled reassessment.[13] For Uzbekistan this implies (1) regional nephrology preparation centers, (2) a standardized logistics protocol for transferring donor–recipient pairs, and (3) shared follow-up between the region and the hub. This model would also reduce the financial and social burden of long-distance travel for families.

4.4. Components of feasibility

The program's feasibility rests on four elements: a legal framework (Law No. ZRU-768) that defines voluntariness, medical suitability, and donor protection; a sufficient donor pool, evidenced by 100% suitability among fully evaluated relatives; standardized donor and recipient preparation, which was associated with the absence of major surgical morbidity; and modern imaging for donor selection. Together with a multidisciplinary team, these elements form a reproducible template for other centers in the region. Because children differ from adults in body size, urinary tract anatomy, and comorbidity, standardized perioperative protocols and close postoperative surveillance of graft function, urine output, and fluid balance are especially important during a program's early years.

4.5. Limitations

The single-center design and modest cohort size limit generalizability. Follow-up, although reaching 5 years for the earliest patients, is short relative to the lifetime horizon of pediatric recipients, so late graft failure and chronic complications could not be assessed. There was no comparison group (deceased-donor recipients or children remaining on dialysis). Quality of life, growth, and psychosocial development were not measured with validated instruments, and long-term donor renal function was not analyzed; both are priorities for future work.

5. CONCLUSIONS

A pediatric living-related-donor kidney transplantation program has been successfully established in Uzbekistan. Rigorous four-stage donor selection with routine MSCT angiography, standardized recipient preparation, single-team surgery with short cold ischemia, and a uniform immunosuppressive protocol yielded early and mid-term outcomes comparable with leading international registries, without severe surgical complications or donor morbidity. The program's nationwide catchment and stable family donor pool provide the basis for regional scaling through a hub-and-spoke model. Multicenter studies with longer follow-up are needed to define long-term patient, graft, and donor outcomes and to inform national evidence-based protocols.

Acknowledgments

The authors thank the transplant surgeons, pediatricians, nephrologists, anesthesiologists, and radiologists of the Vakhidov Center for their contribution to patient care and data collection.

Author Contributions

F.Sh.B., Z.T.M., J.B.U., and N.B.E.: conceptualization, methodology, investigation, patient management, data curation, formal analysis, and writing – original draft. D.A.: writing – review and editing. All authors read and approved the final manuscript.

Funding

This study received no external funding.

Conflict of Interest

The authors declare no conflict of interest.

Ethics Statement

The study protocol was approved by the Ethics Committee of the Republican Specialized Scientific-Practical Medical Center of Surgery named after Academician V. Vakhidov (Protocol No. 342.12.76). Written informed consent was obtained from all donors and from the legal representatives of all recipients.

Data Availability Statement

The anonymized data supporting the findings of this study are available from the corresponding author upon reasonable request.

Declaration of Generative AI Use

During manuscript preparation, the authors used Claude (Anthropic) for language editing and formatting. The authors reviewed and edited the output and take full responsibility for the content of the publication.

REFERENCES

[1] Chua A, Cramer C, Moudgil A, et al. Kidney transplant practice patterns and outcome benchmarks over 30 years: the 2018 report of the NAPRTCS. *Pediatr Transplant*. 2019;23(8):e13597. doi:10.1111/petr.13597

[2] Foster BJ, Dahhou M, Zhang X, et al. Association between age and graft failure rates in young kidney transplant recipients. *Transplantation*. 2011;92(11):1237-1243. doi:10.1097/TP.0b013e31823411d7

[3] Pape L, Ehrich JHH, Offner G. Long-term follow-up of pediatric renal transplant recipients: mortality, graft survival, and complications. *Pediatr Transplant*. 2004;8(4):357-363. doi:10.1111/j.1399-3046.2004.00169.x

[4] Van Arendonk KJ, Boyarsky BJ, Orandi BJ, et al. National trends over 25 years in pediatric kidney transplant outcomes. *Pediatrics*. 2014;133(4):594-601. doi:10.1542/peds.2013-2775

[5] Bonthuis M, Vidal E, Bjerre A, et al. Ten-year trends in epidemiology and outcomes of pediatric kidney replacement therapy in Europe: data from the ESPN/ERA-EDTA Registry. *Pediatr Nephrol*. 2021;36(8):2337-2348. doi:10.1007/s00467-021-04928-w

[6] Al-Sheyyab M, Batieha A, El-Khateeb M, Ajlouni K. Pediatric kidney transplantation experience in Jordan. *Ann Transplant*. 2013;18:113-116. doi:10.12659/AOT.883831

[7] Kaabak MM, Babenko NN, Dymova OV, et al. Kidney transplantation in children: thirty years of single-center experience. *Pediatria J named after GN Speransky*. 2020;99(5):8-17. doi:10.24110/0031-403X-2020-99-5-8-17 (in Russian)

[8] Kaabak MM, Babenko NN, Morozova MM, et al. Long-term results of kidney transplantation in young children. *Russ J Transplantol Artif Organs*. 2020;22(1):26-33. doi:10.15825/1995-1191-2020-1-26-33 (in Russian)

[9] Naumenko LN, Karas SI, Prasolova NM, et al. Pediatric kidney transplantation: a 20-year experience of the Belarusian Center. *Novosti Khirurgii*. 2019;27(3):301-309. doi:10.18484/2305-0047.2019.3.301

[10] Francis A, Harhay MN, Ong ACM, et al. Chronic kidney disease and the global public health agenda: an international consensus. *Nat Rev Nephrol*. 2024;20(7):473-485. doi:10.1038/s41581-024-00820-6

[11] Harambat J, van Stralen KJ, Kim JJ, Tizard EJ. Epidemiology of chronic kidney disease in children. *Pediatr Nephrol*. 2012;27(3):363-373. doi:10.1007/s00467-011-1939-1

[12] Moysyuk YaG, Stolyar AG, Azarenkova OV, Malinovskaya AV. Kidney transplantation: the current state of the problem. *Russ J Transplantol Artif Organs*. 2012;14(3):45-55 (in Russian)

[13] Reese PP, Amaral S, Nathan H. National need for hub-and-spoke transplant systems: lessons learned from other specialties. *Am J Transplant*. 2017;17(1):5-7. doi:10.1111/ajt.14005

[14] Sabharwal S, Berger L, Ali S, et al. Pediatric kidney transplantation in low- and middle-income countries: a review of current status and challenges. *Pediatr Nephrol.* 2020;35(7):1179-1189. doi:10.1007/s00467-019-04274-y

[15] Kizilbash SJ, Rheault MN, Bangdiwala A, et al. Comparison of living-related and deceased-donor kidney transplant outcomes in children. *Pediatr Nephrol.* 2019;34(7):1305-1310. doi:10.1007/s00467-019-04212-y

[16] Ojo AO, Hanson JA, Meier-Kriesche H, et al. Survival in recipients of marginal cadaveric donor kidneys compared with other recipients and wait-listed transplant candidates. *J Am Soc Nephrol.* 2001;12(3):589-597. doi:10.1681/ASN.V123589

[17] Serrano OK, Bangdiwala AS, Vock DM, et al. Age of the donor as a factor in kidney transplant survival: an OPTN/UNOS analysis. *Am J Transplant.* 2020;20(1):193-200. doi:10.1111/ajt.15515

[18] Van Zwet EW, Buishand JM, Bemelman FJ, et al. Parental donation as the primary source of living donor kidneys for children: single-centre experience over three decades. *Nephrol Dial Transplant.* 2018;33(11):2065-2071. doi:10.1093/ndt/gfy132

[19] Amaral S, Sayed BA, Kutner N, Patzer RE. Preemptive kidney transplantation is associated with survival benefits among pediatric patients with end-stage renal disease. *Kidney Int.* 2016;90(5):1100-1108. doi:10.1016/j.kint.2016.07.028

[20] Franke D, Winkel S, Gellermann J, et al. Growth after pediatric kidney transplantation: impact of donor source and immunosuppressive regimen. *Pediatr Transplant.* 2020;24(4):e13684. doi:10.1111/petr.13684

[21] Bebbington E, Miles A, Pesa J, et al. Multidetector computed tomography for renal donor evaluation: a systematic review and meta-analysis. *Transplant Rev (Orlando).* 2019;33(2):73-79. doi:10.1016/j.trre.2018.10.001

[22] Fahmy LM, Massie AB, Muzaale AD, et al. Long-term renal function in living kidney donors who had histological abnormalities at donation. *Transplantation.* 2016;100(6):1294-1298. doi:10.1097/TP.0000000000001236

[23] Grams ME, Sang Y, Levey AS, et al. Kidney-failure risk projection for the living kidney-donor candidate. *N Engl J Med.* 2016;374(5):411-421. doi:10.1056/NEJMoa1510491

[24] Lentine KL, Kasiske BL, Levey AS, et al. KDIGO clinical practice guideline on the evaluation and care of living kidney donors. *Transplantation.* 2017;101(8S Suppl 1):S1-S109. doi:10.1097/TP.0000000000001769

[25] Muzaale AD, Massie AB, Wang MC, et al. Risk of end-stage renal disease following live kidney donation. *JAMA.* 2014;311(6):579-586. doi:10.1001/jama.2013.285141

[26] Pruett TL, Tibell A, Alabdulkareem A, et al. The ethics statement of the Vancouver Forum on the live lung, liver, pancreas, and intestine donor. *Transplantation.* 2006;81(10):1386-1387. doi:10.1097/01.tp.0000214976.36526.e3

[27] Gautier SV, Khomyakov SM. Organ donation and transplantation in the Russian Federation in 2022. 15th report of the Registry of the Russian Transplant Society. *Russ J Transplantol Artif Organs.* 2023;25(3):8-30. doi:10.15825/1995-1191-2023-3-8-30 (in Russian)

[28] Olkhova EB, Kaabak MM, Babenko NN, et al. Ultrasound monitoring of the transplanted kidney in children in the early postoperative period. *Ultrasound Funct Diagn.* 2018;(3):46-58 (in Russian)

[29] Weng FL, Reese PP, Waterman AD, et al. Race and electronically measured monitoring of blood pressure and medication adherence in kidney transplant recipients. *Ethn Dis.* 2014;24(3):323-329.

Tables

Table 1. Intraoperative parameters (n = 52)

Parameter	M ± SE	Range
Cold ischemia time, min	42.5 ± 1.8	22–58
Second warm ischemia time, min	33.4 ± 1.1	22–46
Operative duration, min	231.6 ± 8.2	175–305

Parameter	M ± SE	Range
Time to diuresis after reperfusion, min	6.2 ± 0.4	2–10
Intraoperative blood loss, mL	174.3 ± 12.7	80–380

M ± SE, mean ± standard error.

Figure Legends

Figure 1. Prevalence of comorbid conditions among recipients (n = 52). LV, left ventricular.

Figure 2. Donor kinship structure (n = 52). Mothers 46.2%, fathers 30.8%; parents combined 76.9%.

Figure 3. Regional origin of recipients (n = 52). Dark blue, capital area (Tashkent city and Tashkent region); teal, other regions of Uzbekistan; coral, foreign recipient.

Figure 4. Mean donor age by kinship (mean ± SE).

Figure 5. MSCT angiography of a donor kidney showing bilateral accessory lower-pole renal arteries.

Figure 6. Kaplan–Meier patient and graft survival (n = 52). Arrows mark events: one death and two graft losses; graft survival was not censored for death.

Graphical Abstract (text specification for the required visual abstract)

Left panel: "52 children, 5–17 years, Uzbekistan 2020–2025, living-related donors (parents 77%)". *Center panel:* "Four-stage donor selection + MSCT angiography → cold ischemia 42 min → diuresis < 10 min in 100%". *Right panel:* "5-year patient survival 98.1%; graft survival 94.2%; no major complications". *Footer:* "Pediatric LRD kidney transplantation is feasible in Central Asia."