Scientific Research Publishing

Open Journal of Nephrology, 2025, 15(4), 506-512
https://www.scirp.org/journal/ojneph
ISSN Online: 2164-2869
ISSN Print: 2164-2842

Renal Transplant in a Hypersensitive Patient: A Case Report

Cristian León-Rabanal[1,2*], Luis Zegarra-Montes[2,3], Rodrigo Castro de la Mata Guerra-García[4], Justo Dueñas-Chuquimia[5], Estefano Marcelo Benites[6], Andrea Valdez[6]

[1]Nephrology Department, Clínica Delgado, Lima, Peru
[2]School of Medicine, Universidad Peruana Cayetano Heredia (UPCH), Lima, Peru
[3]Urology Department, Clínica Delgado, Lima, Peru
[4]General Surgery Department, Clínica Delgado, Lima, Peru
[5]Interventional Radiology Department, Clínica Delgado, Lima, Peru
[6]School of Medicine, Universidad Peruana de Ciencias Aplicadas (UPC), Lima, Peru
Email: *cristian.leon.r@upch.pe

How to cite this paper: León-Rabanal, C., Zegarra-Montes, L., Castro de la Mata Guerra-García, R., Dueñas-Chuquimia, J., Benites, E.M. and Valdez, A. (2025) Renal Transplant in a Hypersensitive Patient: A Case Report. *Open Journal of Nephrology*, **15**, 506-512.
https://doi.org/10.4236/ojneph.2025.154047

Received: October 7, 2025
Accepted: November 8, 2025
Published: November 11, 2025

Abstract

In hypersensitized patients, Kidney Transplant (KT) rates are low due to the risk of organ loss due to rejection. Desensitization (DS) protocols have been developed to prevent rejection, increasing their success. We present the case of a 65-year-old female patient with Chronic Kidney Disease (CKD) associated with Hypertensive Nephroangiosclerosis (HNA) on Hemodialysis (HD). She was documented to have hypersensitization against Human Leukocyte Antigen (HLA), presenting Donor-Specific Antibodies (DSA) detected by solid-phase techniques, making her a high-immunological risk patient. With a suitable living donor available, a desensitization protocol was initiated. DS treatment consisted of plasmapheresis, Intravenous Immunoglobulin (IVIG) and Rituximab, with a successful KT result.

Keywords

HLA Hypersensitivity, Desensitization, Renal Transplants

1. Introduction

KT is considered the treatment of choice for patients with grade 5 CKD, as it not only offers a longer survival compared to other renal replacement therapies, but also provides a better quality of life [1]-[4]. KT significantly improves quality of life and survival; however, according to the European Society for Organ Transplantation, almost 50% of patients lose their graft within a maximum of 10 years.

The main cause for this failure is Antibody-Mediated Rejection (AMR), particularly DSA [5]. HLA sensitization can originate from previous blood transfusions, pregnancies, or previous transplants. The presence of DSA at the time of transplant is associated with a high risk of hyperacute rejection and adverse outcomes in graft survival. Highly sensitized kidney transplant candidates, commonly defined as those with a PRA ≥ 80%, face significant barriers to transplantation due to the high likelihood of DSA against HLA antigens. Some centers consider a PRA ≥ 50% clinically significant when strong class II reactivity is detected [6]; however, for consistency, this report uses the ≥80% threshold to define high sensitization. DS strategies combining plasmapheresis, IVIG, and Rituximab have expanded transplant access for this high-risk population. This case demonstrates the successful application of such a protocol in a resource-limited Latin American setting [7] [8].

The introduction of serological cross-match laboratory tests and the exclusion of donors with HLA antigens recognized by circulating antibodies in the recipient led to a significant decrease in the incidence of hyperacute rejection [9]. Detection of anti-HLA antibodies is a key component in pre-transplant immunological risk assessment. The single antigen bead assay (SAB; Luminex Corporation, Austin, TX) allows for highly accurate identification and characterization of DSA in sensitized candidates [10]. DS therapy aims to reduce DSA to levels compatible with a negative crossmatch at the time of transplant. HLA-incompatible KT can be considered if the Complement-Dependent Cytotoxicity (CDC) crossmatch test is negative. For this purpose, various protocols are used, typically including plasmapheresis, low-dose (100 mg/kg) or high-dose (2 g/kg) IVIG, and/or B-cell depleting agents [11].

This case is relevant as it is the second kidney transplant from a living donor with hypersensitivity managed using a DS protocol reported in Lima, Peru [12]. This type of intervention, still uncommon in the national context, highlights both the technical complexity of the immunological approach and the feasibility of implementing advanced therapies in health systems with structural limitations.

2. Case Presentation

A 65-year-old female with grade 5 CKD associated with HNA and 4 years on HD was evaluated for the possibility of living-related donor transplantation. She had grade 1 obesity, moderate symptomatic anemia (8.6 g/dL), was postmenopausal, had multiple pregnancies (G9 P8018), chronic gastritis, and hepatic steatosis. She also underwent subtotal parathyroidectomy and was receiving folic acid, iron carboxymaltose, erythropoietin alpha, calcitriol, and calcium citrate + vitamin D.

A state of HLA hypersensitivity was identified, with the presence of preformed DSA detected by the Luminex technique (Luminex Single Antigen Beads—SAB). She had a calculated PRA of 96% and detectable class II DSA directed against HLA-DR7, with a baseline Mean Fluorescence Intensity (MFI) of 14,200. The living donor was HLA-DR7 positive, confirming the donor specificity of the antibody. The

presence of these antibodies constitutes a relative contraindication for direct transplantation, due to the high risk of AMR and early graft loss.

Given that the patient has a related living donor, is mentally and physically fit, and has adequate renal vascular anatomy, it was decided to initiate a DS protocol (Baltimore regimen) with the goal of reducing antibody levels below the acceptable threshold for transplantation. This consisted of four sessions of therapeutic plasma exchange, followed by the administration of low-dose human immunoglobulin and finally Rituximab (a monoclonal antibody against the B-cell receptor CD20), administered one week before the final session, with no adverse effects on the patient (Table 1).

After the last plasmapheresis session, the anti-DR7 DSA MFI decreased to 2800, representing an 80% reduction. The crossmatch converted from positive to negative, allowing a successful living donor kidney transplant. The immediate postoperative course was uneventful. Serum creatinine decreased from 6.8 mg/dL pretransplant to 1.2 mg/dL at discharge (postoperative day 10), with no evidence of antibody-mediated rejection during the first six months of follow-up. The patient subsequently developed an abdominal hernia, which was surgically resolved, and a lymphocele drained by interventional radiology, which resolved within two weeks. Induction immunosuppression consisted of polyclonal globulin of animal origin (rabbit) directed against human T lymphocytes at doses of 1 mg/kg/day until reaching 4.5 to 7.5 mg/kg of accumulated dose and maintenance immunosuppression consisted of the use of calcineurin inhibitors (Tacrolimus 0.10 - 0.15 mg/kg/day in two doses every 12 h with target blood levels: 8 - 12 ng/ml), corticosteroids (Prednisone 30 mg/day) and antiproliferatives (Mycophenolate Mofetil 1000 mg every 12 hours).

Table 1. Desensitization protocol.

Stage	Intervention	Dose/Volume
TPE	Plasmapheresis	1.5 × TPV per session
IVIG	Intravenous	100 mg/kg after each TPE
Rituximab (if high DSA)	Anti-CD20	375 mg/m^2

TPE: Therapeutic Plasma Exchange, TPV: Total Plasma Volume, IVIG: Intravenous Immunoglobulin, DSA: Donor-Specific Antibodies, CD20: Cluster of Differentiation 20.

3. Discussion

The prevalence of CKD in Peru, according to the latest available report from 2015, was 16% - 18%. However, in Peru, there are no updated studies reflecting the prevalence in recent years, despite the apparent upward trend, mainly attributed to the increase in cardiovascular diseases such as high blood pressure and diabetes mellitus, which account for more than 60% of CKD cases [13] [14].

Sensitization to non-self HLA antigens occurs primarily as a result of prior immunological exposures, such as blood transfusions, pregnancies, or previous transplants. This sensitization represents a significant barrier to accessing KT. The pres-

ence of elevated levels of DSA directed against HLA antigens at the time of transplantation has been associated with an increased risk of hyperacute rejection and adverse outcomes in graft survival [15]. Living donor KT represents a viable alternative for sensitized or highly sensitized patients, following DS with therapeutic regimens including plasmapheresis, IVIG, Rituximab, and/or Bortezomib, administered according to individual, combined, or sequential protocols [16].

Our patient was considered unviable without prior intervention due to positive anti-HLA class II antibodies, with a calculated PRA of 96% for class II, according to Luminex screening. Antibodies reactive against HLA-DR7, matching the donor's HLA profile. Despite a negative crossmatch for T and B lymphocytes, positivity for HLA class II and general hypersensitivity represented an increased risk of AMR.

Desensitization regimens have evolved from single-agent protocols to more sophisticated combinations that allow for successful transplants in highly sensitized patients. The choice of protocol should be personalized according to the type of donor (living or cadaveric), the time available before transplant, and the DSA or PRA level. The Baltimore regimen was chosen because it is the most widely used protocol for transplants from incompatible living donors (HLA or ABO incompatible), which also progressively and predictably reduces anti-HLA antibodies. This regimen combines plasmapheresis, IVIG, and B-cell depletion with Rituximab to reduce circulating DSA, thus enabling transplantation in highly sensitized patients. Its core principle is sequential antibody removal and prevention of B-cell rebound, with or without complement inhibition. This protocol has shown consistent success in achieving negative crossmatches and acceptable graft outcomes, even in resource-limited settings when adapted appropriately [17].

Compared with the first reported Peruvian case [12], this patient presented with a higher baseline DSA (MFI 14,200 vs. 9000) and received a more intensive plasmapheresis schedule. The rapid MFI decline and sustained graft function observed here suggest that early initiation and tailored adjustment of plasmapheresis sessions may improve efficacy without compromising safety. This case demonstrates that multimodal desensitization is feasible and effective in constrained healthcare environments when managed by a coordinated multidisciplinary team.

Our result of a successful transplant without rejection during or afterward is consistent with the success rates published by different authors such as Shamseddin *et al.* in 2024, where during the years 2013 to 2022 they performed 1000 transplants in patients with cPRA ≥ 95%, with a DS regimen of tacrolimus + mycophenolate + steroids. The results showed that at 5 years, 91.5% had graft survival and 93.4% had patient survival [15]. Another example is the study of Orandi *et al.* in 2016, a study was conducted with 1025 patients from 22 centers, demonstrating that patients who received HLA-incompatible transplants after DS showed significantly higher survival compared to those who remained on the waiting list, with an 8-year survival rate of 76.5% in the HLA-incompatible transplant group versus 43.9% in the waiting list group [18].

Between 2000 and 2010, 21 single-center, retrospective studies were published, including 725 patients undergoing HLA-incompatible KT after DS, with variable selection and treatment criteria. The mean follow-up was 23 months, with an AMR incidence of 28% (range 0% - 80%), graft survival of 86%, and patient survival of 95%. Despite these results, current DS protocols are still associated with a higher rate of AMR and infections, with notable differences between centers [19].

According to studies, HLA-matched DS in living donor KT has been shown to be an option for well-selected patients. It reduces the risk of severe early humoral rejection, improves patient survival compared to dialysis, provides acceptable graft survival, although lower than that of a compatible donor, reduces costs compared to chronic dialysis, is complementary to chronic kidney dialysis, and for many patients represents the only realistic option for transplantation.

Our intervention overcame the initial immunological barrier and led to a successful transplant, establishing a relevant clinical experience in the management of highly sensitized patients in settings with limited availability of compatible donors. As this is our first kidney transplant case with this particular condition, we cannot extrapolate results to broader populations. However, it is a starting point for initiating a management plan for individuals with hypersensitivity to donor organs.

This report highlights the successful use of plasmapheresis, IVIG, and Rituximab to achieve desensitization and enable living donor kidney transplantation in a highly sensitized patient. While this outcome supports the effectiveness of this combination, further multicenter experience is needed to confirm the optimal and most sustainable desensitization approach in similar contexts.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Evans, R.W., Manninen, D.L., Garrison, L.P., Hart, L.G., Blagg, C.R., Gutman, R.A., *et al.* (1985) The Quality of Life of Patients with End-Stage Renal Disease. *New England Journal of Medicine*, **312**, 553-559. https://doi.org/10.1056/nejm198502283120905

[2] Port, F.K. (1993) Comparison of Survival Probabilities for Dialysis Patients vs Cadaveric Renal Transplant Recipients. *JAMA*: *The Journal of the American Medical Association*, **270**, 1339-1343. https://doi.org/10.1001/jama.1993.03510110079036

[3] Russell, J.D., Beecroft, M.L., Ludwin, D. and Churchill, D.N. (1992) The Quality of Life in Renal Transplantation—A Prospective Study. *Transplantation*, **54**, 656-660. https://doi.org/10.1097/00007890-199210000-00018

[4] Castro Filho, J.B.S.D., Pompeo, J.D.C., Machado, R.B., Gonçalves, L.F.S., Bauer, A.C. and Manfro, R.C. (2022) Delayed Graft Function under the Microscope: Surveillance Biopsies in Kidney Transplantation. *Transplant International*, **35**, Article 10344. https://doi.org/10.3389/ti.2022.10344

[5] Mamode, N., Bestard, O., Claas, F., Furian, L., Griffin, S., Legendre, C., *et al.* (2022) European Guideline for the Management of Kidney Transplant Patients with HLA

Antibodies: By the European Society for Organ Transplantation Working Group. *Transplant International*, **35**, Article 1511. https://doi.org/10.3389/ti.2022.10511

[6] Salvadori, M. (2023) Update on Desensitization Strategies and Drugs on Hyperimmune Patients for Kidney Transplantation. *Transplantology*, **4**, 139-150. https://doi.org/10.3390/transplantology4030014

[7] Jordan, S.C., Lorant, T., Choi, J., Kjellman, C., Winstedt, L., Bengtsson, M., *et al.* (2017) IgG Endopeptidase in Highly Sensitized Patients Undergoing Transplantation. *New England Journal of Medicine*, **377**, 442-453. https://doi.org/10.1056/nejmoa1612567

[8] Kasiske, B.L., Zeier, M.G., Chapman, J.R., Craig, J.C., Ekberg, H., Garvey, C.A., *et al.* (2010) KDIGO Clinical Practice Guideline for the Care of Kidney Transplant Recipients: A Summary. *Kidney International*, **77**, 299-311. https://doi.org/10.1038/ki.2009.377

[9] Nadazdin, O., Boskovic, S., Murakami, T., Tocco, G., Smith, R., Colvin, R.B., *et al.* (2011) Host Alloreactive Memory T Cells Influence Tolerance to Kidney Allografts in Nonhuman Primates. *Science Translational Medicine*, **3**, 86ra51. https://doi.org/10.1126/scitranslmed.3002093

[10] Lefaucheur, C., Suberbielle-Boissel, C., Hill, G.S., Nochy, D., Andrade, J., Antoine, C., *et al.* (2008) Clinical Relevance of Preformed HLA Donor-Specific Antibodies in Kidney Transplantation. *American Journal of Transplantation*, **8**, 324-331. https://doi.org/10.1111/j.1600-6143.2007.02072.x

[11] Loupy, A., Suberbielle-Boissel, C., Zuber, J., Anglicheau, D., Timsit, M., Martinez, F., *et al.* (2010) Combined Posttransplant Prophylactic IVIg/Anti-CD 20/plasmapheresis in Kidney Recipients with Preformed Donor-Specific Antibodies: A Pilot Study. *Transplantation*, **89**, 1403-1410. https://doi.org/10.1097/tp.0b013e3181da1cc3

[12] Essalud (2016) Hospital Rebagliati realiza con éxito primer trasplante de riñón del país con donante vivo relacionado de grupo sanguíneo diferente. https://www.essalud.gob.pe/hospital-rebagliati-realiza-con-exito-primer-trasplante-de-rinon-del-pais-con-donante-vivo-relacionado-de-grupo-sanguineo-diferente/

[13] Herrera-Añazco, P., Pacheco-Mendoza, J. and Taype-Rondan, A. (2016) La enfermedad renal crónica en el Perú. Una revisión narrativa de los artículos científicos publicados. *Acta Medica Peruana*, **33**, 130-137. https://doi.org/10.35663/amp.2016.332.63

[14] Loza Munarriz, C. (2022) Boletín epidemiológico Volumen 31 SE 10. https://epipublic.dge.gob.pe/uploads/boletin/boletin_202210_30_230802.pdf

[15] Shamseddin, M.K., Paraskevas, S., Mainra, R., Maru, K., Piggott, B., Jagusic, D., *et al.* (2024) Canadian Highly Sensitized Patient Program Report: A 1000 Kidney Transplants Story. *Canadian Journal of Kidney Health and Disease*, **11**, 1-11. https://doi.org/10.1177/20543581241306811

[16] Kahwaji, J., Jordan, S.C., Najjar, R., Wongsaroj, P., Choi, J., Peng, A., *et al.* (2016) Six-year Outcomes in Broadly Hla-Sensitized Living Donor Transplant Recipients Desensitized with Intravenous Immunoglobulin and Rituximab. *Transplant International*, **29**, 1276-1285. https://doi.org/10.1111/tri.12832

[17] Stegall, M.D., Gloor, J., Winters, J.L., Moore, S.B. and DeGoey, S. (2006) A Comparison of Plasmapheresis versus High-Dose IVIG Desensitization in Renal Allograft Recipients with High Levels of Donor Specific Alloantibody. *American Journal of Transplantation*, **6**, 346-351. https://doi.org/10.1111/j.1600-6143.2005.01178.x

[18] Orandi, B.J., Luo, X., Massie, A.B., Garonzik-Wang, J.M., Lonze, B.E., Ahmed, R., *et al.* (2016) Survival Benefit with Kidney Transplants from HLA-Incompatible Live

Donors. *New England Journal of Medicine*, **374**, 940-950.
https://doi.org/10.1056/nejmoa1508380

[19] Marfo, K., Lu, A., Ling, M. and Akalin, E. (2011) Desensitization Protocols and Their Outcome. *Clinical Journal of the American Society of Nephrology*, **6**, 922-936.
https://doi.org/10.2215/cjn.08140910