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Teclistamab desensitization of donor-specific antibodies in aplastic anemia

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Graft failure is a major complication in hematopoietic cell transplantation (HCT), leading to high rates of disease relapse and mortality. Donor-specific anti-HLA antibodies (DSAs) are a recognized risk factor for graft failure and poor engraftment after allogeneic hematopoietic cell transplantation (HCT). In patients with severe or very severe aplastic anemia (sAA/vSAA) who lack matched donors and are transfusion-dependent with ongoing infectious risk, timely HCT from an alternative donor is often the only curative option. Desensitization strategies used in solid organ transplantation (plasmapheresis, intravenous immune globulin, rituximab, complement inhibitors and anti-CD38 antibodies) have been variably applied to HCT. However, these protocols remain heterogeneous with no standardized approach established for hematopoietic transplantation, and clinical responses have been suboptimal, mostly derived from small case series with limited patient numbers and variable outcomes.¹

Bispecific T-cell engager therapies targeting plasma cells or T-cell effector functions may offer a rapid method to reduce antibody titers. Teclistamab, a bispecific IgG4 antibody targeting BCMA and CD3, approved for relapsed multiple myeloma. By inducing T-cell-mediated cytotoxicity against plasma cells, it suppresses antibody production, generating interest in antibody-mediated diseases like systemic sclerosis, rheumatoid arthritis, and systemic lupus erythematosus. Case reports describe rapid and sustained reductions in autoantibodies after limited dosing.^{2,3}

We describe two pediatric patients with vSAA and transfusion dependence, multiple infectious events, without a match related donor and high-titer DSAs who received a short course of teclistamab as desensitization prior to haploidentical HCT, and we report clinical outcomes, engraftment, and post-transplant complications.

DSA testing was performed by solid-phase single antigen bead assays with mean fluorescence intensity (MFI) reporting and by FlowDSA-XM™ crossmatch. Teclistamab was administered in both cases subcutaneously at doses of 0.06 mg/kg on day -18, 0.3 mg/kg on day -14, and 1 mg/kg on day -10 (Figure 1). The teclistamab dose was reduced from that used in pivotal myeloma trials, but still within the range associated with pharmacologic activity during early clinical development of teclistamab (0.72-1.5 mg/kg)⁴, with a limited exposure that has shown preliminary efficacy in patients with other refractory autoimmune conditions.²

DSA levels were monitored serially. Conditioning regimens, graft characteristics, graft-versus-host-disease (GVHD) prophylaxis, supportive care, and microbiologic testing were performed per institutional protocols. No investigational dosing beyond compassionate-use or off-label clinical practice parameters is asserted; descriptions reflect observed clinical management. Written informed consent for treatment and for publication of clinical data was obtained from the patients' parents. This study

was performed in accordance with the ethical principles of the Declaration of Helsinki and the ethical rules and regulations of Mexico.

Patient 1: A 12-year-old girl with newly diagnosed vSAA and a prolonged hospitalization (99 days) for right-leg cellulitis, septic shock, and three episodes of neutropenic fever. Antimicrobial therapy included meropenem (40 days), linezolid (14 days), and vancomycin; probable hepatic fungal abscesses required four weeks of amphotericin B. Blood cultures yielded *Staphylococcus haemolyticus*, extended-spectrum β -lactamase-producing *Klebsiella pneumoniae*, and carbapenemase-producing *Citrobacter* species.

No matched related donor was available; two potential haploidentical siblings were identified. Pretransplant testing revealed DSAs against multiple class I HLA antigens; the dominant specificity was anti-HLA A*11:02 (MFI 3,200) with a positive FlowDSA-XM™ crossmatch. Given the urgent need for HCT and absence of effective alternatives, teclistamab was administered as a short desensitization course after two sessions of plasma exchange. DSAs became undetectable after the third dose (serial testing confirmed clearance; see Figure 1). No adverse events during the desensitization regimen were observed.

She received a haploidentical peripheral blood stem cell graft from a sibling (10×10^6 CD34+ cells/kg) with 40 mg/kg post-transplant cyclophosphamide on day +3 and +4 which were reduced from 50 mg/kg due to concerns for increased toxicity in the clinical context. Oral cyclosporine and mycophenolate were also used at standard doses. Neutrophil engraftment occurred on day +13 and platelet engraftment on day +16. A catheter-related infection resolved without sequelae. CMV PCR was negative at day +30, transiently rose to $\sim 1 \times 10^6$ copies on day +50 and became undetectable after two weeks of IV ganciclovir. During hospitalization she received 21 red-cell transfusions, four platelets apheresis, and 127 platelet concentrate transfusions; ferritin peaked at 2,332 ng/mL. She developed posterior reversible encephalopathy syndrome attributed to tacrolimus that resolved after conversion to sirolimus. Chimerism studies at days +30 and +100 demonstrated 100% donor cells. IgG on day +50 was 5.91 g/L without additional IVIG. At last follow-up she was asymptomatic, on sirolimus, infection-free, and transfusion-independent.

Patient 2 A 7-year-old boy with vSAA required a 60-day hospitalization for recurrent neutropenic fevers without documented bacterial isolates. No matched donor was available; his mother with a history of 3 pregnancies was the only alternative. DSAs against both class I and II HLA antigens of his mother were detected, with anti-DQB1*03:02 predominant (MFI 2,999). He received the same teclistamab desensitization regimen, achieving complete DSA clearance after the third dose

(Figure 1). During conditioning he developed a generalized exanthem with fever and conjunctivitis; testing for measles, parvovirus, CMV and EBV was negative. Steroids and IVIG led to resolution of the rash.

He received a haploidentical graft (9×10^6 CD34+ cells/kg) with the same GVHD prophylaxis as Patient 1. Neutrophil and platelet engraftment occurred on days +23 and +16, respectively, and full donor chimerism was documented by days +30 and +60. CMV PCR was negative on day +30. IgG on day +35 was 1.95 g/L and an additional IVIG dose was administered. He received nine red-cell transfusions, four platelet apheresis, and 44 platelet transfusions; ferritin peaked at 1,126 ng/mL.

On day +20 he developed severe acute grade 4 GVHD involving skin, liver and the lower gastrointestinal tract. Initial treatment included corticosteroids and ruxolitinib with partial response. His clinical course was complicated by *Clostridioides difficile* infection requiring oral vancomycin and IV metronidazole; human chorionic gonadotrophin was administered empirically (3 doses every 48 hours) with transient improvement, but imaging and clinical signs prompted reinitiation of *C. difficile* therapy. He developed fungal pneumonia treated with voriconazole for four weeks complicated by spontaneous pneumothorax; placement of a pleural catheter was followed by acute hemorrhage and hypovolemic shock. Blood cultures revealed *Pseudomonas aeruginosa* and meropenem was started. He developed septic shock requiring intubation, vasoactive support and ICU care and died three days later.

In both patients teclistamab produced rapid DSA clearance after the third dose without observed infusion-related or immune-mediated adverse events attributable to the drug. Successful neutrophil and platelet engraftment was achieved in both cases. Long-term outcome diverged: patient 1 achieved durable engraftment and clinical recovery, whereas patient 2 succumbed to severe post-transplant complications including grade 4 acute GVHD, infectious complications and hemorrhagic events. The use of peripheral blood from a maternal donor with multiple pregnancies, and a reduction in post-transplant cyclophosphamide dose may have led to the increased severity of GVHD. These outcomes highlight that while DSA clearance enabled engraftment, post-transplant immunologic and infectious complications critically influence survival.

Limitations include the small number of cases, lack of a control group, and absence of standardized teclistamab dosing or timing relative to conditioning in our report. We cannot exclude contributions from concomitant measures (e.g., IVIG, plasmapheresis, supportive care). Safety considerations are critical: teclistamab is associated in other settings with cytokine release syndrome and infections, broader experience is necessary. Compared with rituximab and daratumumab,

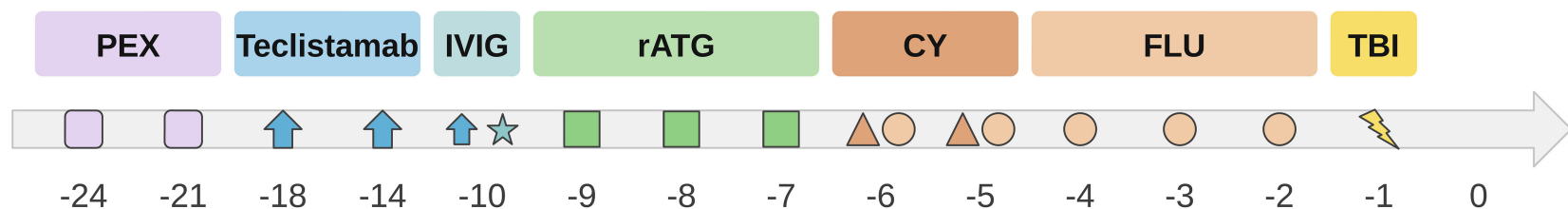
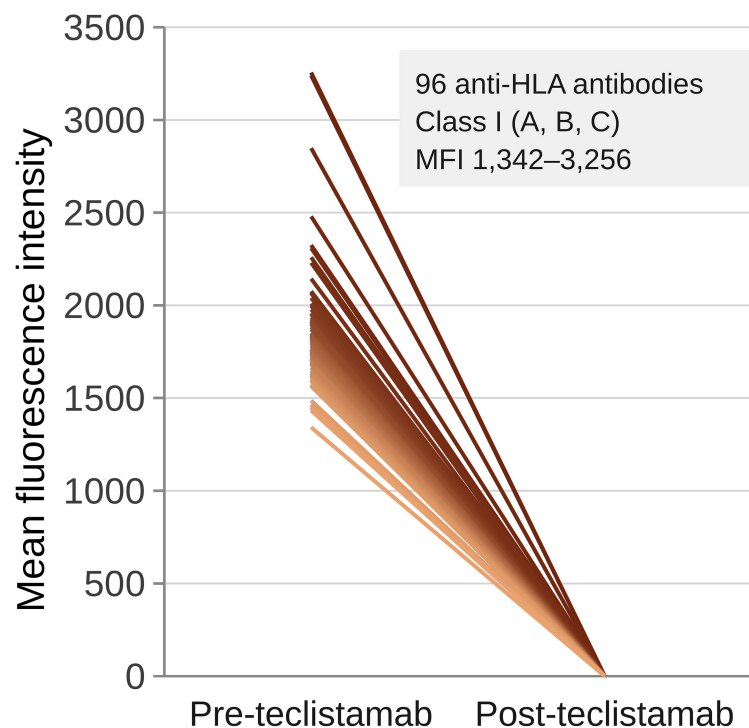
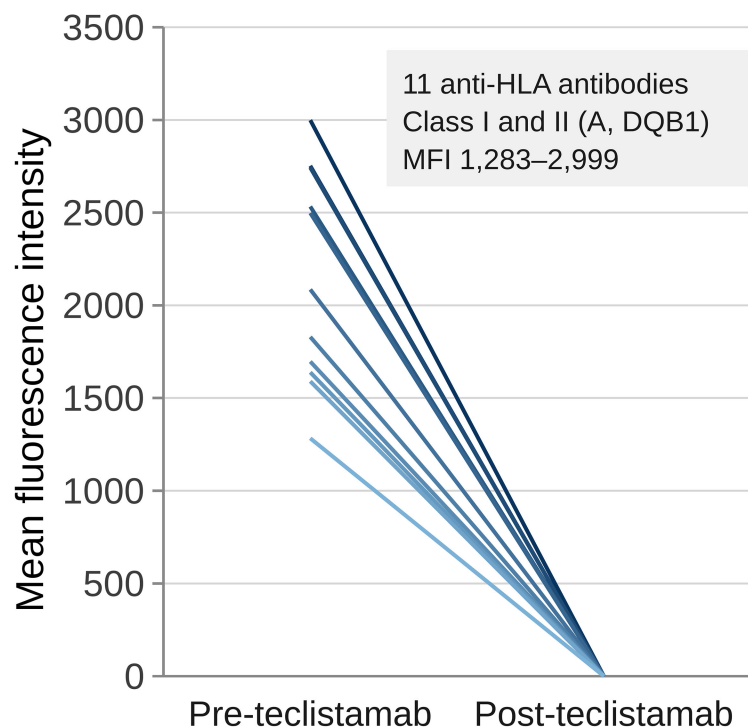
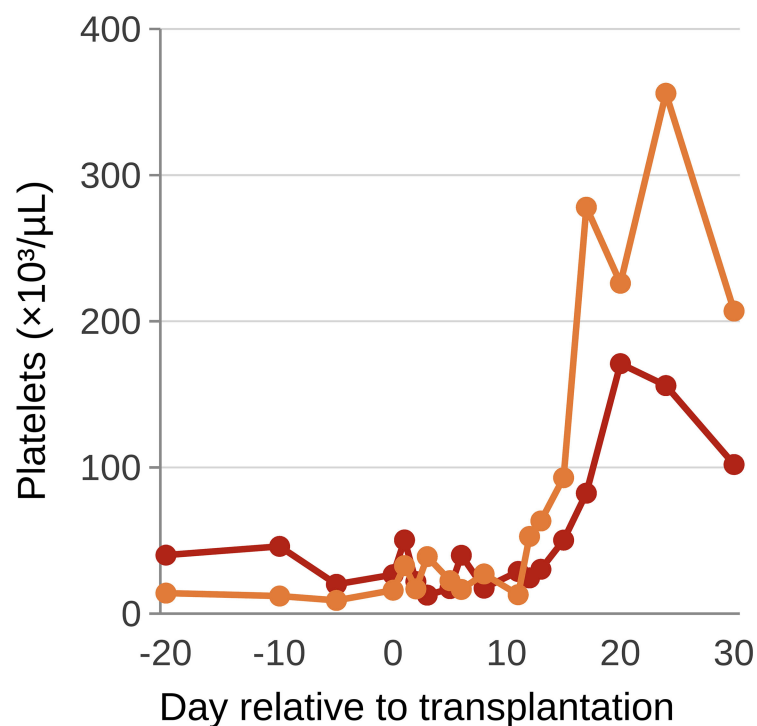
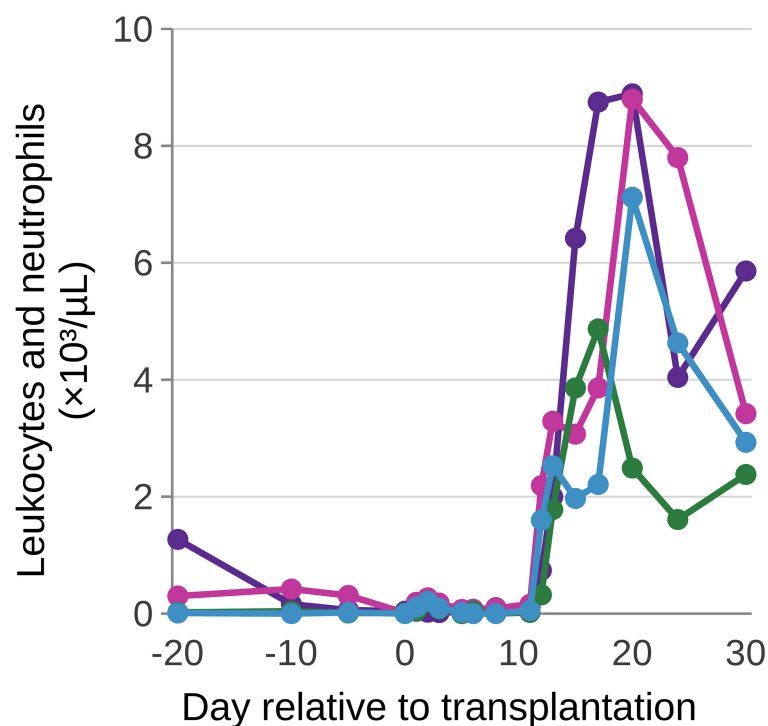
BCMA-targeted T-cell redirection may offer a faster reduction in antibody production, though comparative data are lacking.

Given its mechanism of reducing antibody production rather than directly removing circulating antibodies, future studies could evaluate teclistamab before plasma exchange when immediate antibody removal is not required⁵, or as an adjunct following plasma exchange in patients requiring urgent transplantation. Such studies should also evaluate its interaction with IVIG, effects on immune reconstitution, infectious complications, and long-term safety.

References

- 1.- Ciurea SO, Cao K, Fernandez-Vina M, et al. The European Society for Blood and Marrow Transplantation (EBMT) Consensus Guidelines for the detection and treatment of donor-specific anti-HLA antibodies (DSA) in haploidentical hematopoietic cell transplantation. *Bone Marrow Transplant*. 2018;53(5):521-534.
- 2.- Alexander T, Krönke J, Cheng Q, Keller U, Krönke G. Teclistamab-induced remission in refractory systemic lupus erythematosus. *N Engl J Med*. 2024;391(9):864-866.
- 3.- Siegert E, Biesen R, Dzamukova M, et al. Teclistamab in relapsed systemic sclerosis after autologous haematopoietic stem cell transplantation. *Ann Rheum Dis*. 2025;84(4):653-656.
- 4.- Girgis S, Wang Lin SX, Pillarisetti K, et al. Translational modeling predicts efficacious therapeutic dosing range of teclistamab for multiple myeloma. *Target Oncol*. 2022;17(4):433-439.
- 5.- Schatzl M, Mayer KA, Agis H, et al. T-cell engager-mediated hla antibody depletion before kidney transplantation. *N Engl J Med*. 2026;395(5):511-513.

Figure 1. Teclistamab desensitization regimen and post-transplant engraftment in two children with very severe aplastic anemia. (A) Sequential desensitization and conditioning regimen used in both patients, expressed as days relative to graft infusion (day 0): plasma exchange with albumin (PEX) on days -24 and -21; teclistamab administered subcutaneously at 0.06 mg/kg on day -18, 0.3 mg/kg on day -14 and 1 mg/kg on day -10; and intravenous immunoglobulin (IVIg) 1 g/kg on day -10. Conditioning regimen: rATG, rabbit antithymocyte globulin (0.5 mg/kg on day -9 and 2 mg/kg on days -8 and -7); CY, cyclophosphamide (14.5 mg/kg on days -6 and -5); FLU, fludarabine (30 mg/m² daily on days -6 to -2); and TBI, total body irradiation (4 Gy divided into two fractions, day -1). (B) Anti-HLA antibody mean fluorescence intensity (MFI) before and after teclistamab administration in patient 1 (left) and patient 2 (right). Each line represents a single HLA specificity measured by single-antigen bead assay; the number of specificities, the loci involved and the MFI range are shown within each plot. Lines are shaded from darkest (highest MFI) to lightest to separate overlapping specificities; the gradient conveys no information beyond the MFI shown on the y-axis. All specificities became undetectable after the third dose. (C) Hematologic recovery in both patients. Leukocyte and neutrophil counts (left) and platelet counts (right) are shown in $\times 10^3/\mu\text{L}$ against days relative to transplantation.

A**B****Patient 1****Patient 2****C****Patient 1** ● Leukocytes

● Neutrophils

● Platelets

Patient 2 ● Leukocytes

● Neutrophils

● Platelets