Outcomes of Second Allogeneic Hematopoietic Stem Cell Transplantation in Patients with Acute Leukemia: A Single-Center Retrospective Analysis

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Background. Second allogeneic hematopoietic stem cell transplantation (allo-HSCT2) is one of the few potentially curative options for acute leukemia relapsing or with primary graft failure after first allo-HSCT. In an EBMT registry of 1540 relapsed AML patients, 2-year overall survival (OS), leukemia-free survival (LFS), and GVHD-free, relapse-free survival (GRFS) were 31.2%, 22.2%, and 15.5%. Donor selection (same versus different donor) has not consistently affected survival. We describe outcomes and strategies for acute leukemia patients undergoing allo-HSCT2.

Methods. We retrospectively analyzed AML or ALL patients who underwent allo-HSCT2 at a single center (2011–2025; n=25). OS, LFS, and GRFS were estimated by Kaplan–Meier and defined per CIBMTR criteria; the chronic-GVHD component of GRFS was any recorded chronic GVHD. Regimen and donor groups were compared by log-rank test. Given the small size, all comparisons are descriptive and hypothesis-generating.

Results. Median age was 39.3 years (range 21.5–66.6); 72% had AML and 28% ALL. Only 5 (20%) were in CR1; 80% were in CR2+ or refractory. Indications: relapse (80%), graft failure (16%), transformation from antecedent MDS (4%). Unrelated-donor use rose between transplants (44% to 60%), and 20 (80%) received a different donor. Conditioning was myeloablative (64%) or reduced-intensity (36%). Median follow-up of survivors was 25.7 months. Median OS, LFS, and GRFS were 7.1, 4.2, and 4.0 months; OS at 1/2/3 years was 36%/22%/22%. Twenty (80%) died, most often from infection (15/20). No regimen or donor grouping was significantly associated with outcome; the only signal was longer median OS with same versus different donor (13.1 vs 4.9 months; p=0.18).

Conclusions. Second-transplant survival was limited (2-year OS 22%), below most published series—consistent with a case mix enriched for disease beyond CR1 (80%). Infection was the leading cause of death. Improving outcomes likely depends on disease control before transplant, careful patient selection, and infection prophylaxis.