DT-PACE is Equivalent or Superior to Cytoxan + GCSF or GCSF Alone for the Collection of CD34 Cells in Multiple Myeloma

Farheen Shah-Khan MD, Laura Cooling MD, MS, Sandra Hoffmann MT(ASCP)SBB, Shin Mineishi MD, Michelle Herrst MT(ASCP), Robertson Davenport MD

University of Michigan Health System, Ann Arbor, Michigan

Introduction

Autologous transplantation has become a common treatment for multiple myeloma (MM). At the University of Michigan, 52% of all patients referred for autologous peripheral hematopoietic progenitor cell collection (HPC-A) carry a diagnosis of MM. Historically, these patients were mobilized with cytoxan (CTX) + GCSF. Over the last several years, we observed in increasing number of patients mobilized with either GCSF only or after treatment with DT-PACE (cisplatin, doxorubicin, cytoxan, etoposide, dexamethasone and thalidomide). We retrospectively compared the efficiency of DT-PACE, CTX or GCSF alone to mobilize CD34 cells in MM patients.

Methods

A 3 year retrospective analysis was performed of all MM patients who underwent leukopheresis for autologous HPC-A collection at the University of Michigan between 2005-2007. Inclusion criteria were a diagnosis of MM, an age >18 years and an initial mobilization with either Cytoxan + GCSF (CTX), DT-PACE + GCSF or GCSF alone. Patient data included age, sex, weight, MM subtype and peripheral blood counts on the first day of collection (WBC, %MNC, %CD34, CD34μL). Collection data included the number of procedures per mobilization cycle, total blood volume (TBV) processed and CD34 yields (CD34/kg).

Patients were collected on a Cobe Spectra cell separator. For CTX and DT-PACE patients, leukopheresis was initiated when the WBC=5000/μL. For GCSF only patients, leukopheresis was initiated on the 5th day of GCSF administration. A total of 2.5-3 TBV were processed per procedure. Leukopheresis was continued until a target yield of 6 x 10^6 CD34 cells/kg, or sufficient cells for 2 transplants (TXP), was collected. HPC collection was terminated if patients collected <0.5 x 10^6 CD34/kg in 2 consecutive collections.

Data were analyzed relative to mobilization regiment. For patients requiring remobilization, each mobilization cycle was included and analyzed as a separate event. Endpoints included the total CD34/kg yield, number of procedures required to collect 3 x 10^6 (1 TXP) & 6 x 10^6 CD34 cells/kg (2 TXP) and number of mobilization failures. Statistical significance was determined by chi-square, standard t-test and paired t-test. Statistics and graphics were performed with commercial software.

Demographics

A total of 134 mobilization cycles, involving 385 procedures and 128 patients, were available for analysis: Six patients were remobilized with CTX, DT-PACE and GCSF. In these patients, both cycles were included as separate events for analysis. A comparison of the 3 mobilization regiments in shown in Tables 1 and 2. There was no significant difference in patient age, sex, weight, TBV processed or MM subtypes between regiments although CTX mobilized patients tended to be younger.

Results

DT-PACE and CTX are Superior to GCSF alone for CD34 Mobilization

DT-PACE and CTX resulted in higher circulating CD34/μL counts & total CD34 yields (CD34/kg) over GCSF alone (Fig 2A, Table 2). Mobilization with GCSF alone was associated with more procedures per mobilization cycle and nearly twice the rate of mobilization failures (Table 2). Only 44% of GCSF patients achieved > 6 x 10^6 CD34/kg (2 transplants) in a single mobilization versus 64% of DT-PACE (P=0.06, OR=2.22) and 77% of CTX patients (P=0.003, OR=3.67: Fig 2C). When examined by procedure, 58% of CTX (P<0.0001, OR=19), 37% of DT-PACE (P=0.002, OR=6.57) and 6% of GCSF patients collected 6 x 10^6 CD34/kg in 1-2 leukopheresis procedures.

Marrow Recovery is Delayed following DT-PACE

CTX is typically administered 11 days prior to the first scheduled HPC collection; however, the optimal time for DT-PACE was unclear. As shown in Fig. 1, the mean time between chemotherapy and marrow recovery (WBC ≥ 5000/μL) was delayed in DT-PACE patients (15 ± 2.2 versus 12.9 ± 1.8 days, P=0.0004). 87% DT-PACE had evidence of marrow recovery on or after day 14. DT-PACE should be administered 14-15 days prior to the first scheduled HPC collection.

Conclusions

In MM patients, DT-PACE + GCSF allowed a predictable and efficient collection of CD34 cells with a limited number of procedures. DT-PACE and CTX were equivalent relative to CD34 mobilization and final CD34/kg yields. CTX mobilized patients were more likely to collect > 6 X 10^6 CD34/kg in only 1-2 procedures. Both DT-PACE and CTX were superior to GCSF alone for CD34 mobilization in MM patients.