CORRESPONDENCE

Autologous Hematopoietic Stem Cell Transplantation for Multiple Myeloma in India

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To the Editor,

There is lack of data on multiple myeloma (MM) transplants from India [1]. In this regard, we read article by Malhotra et al. [2] with interest and will like to share our data.

Over last 5 years 60 autologous hematopoietic stem cell transplant (HSCT) were performed for 55 patients (21 females) with MM. Five patients underwent tandem autologous BMT and were excluded. Data on remaining 50 patients are presented. Stem cells were stored in blood bank refrigerator at 4 °C. CD34 cell enumeration was performed using ISHAGE protocol [3].

Transplant parameters are outlined in Table 1. Median age was 56 years (36–68 years). Thirty-one patients were in complete remission (CR), 3 had very good partial remission (VGPR), 15 had partial remission (PR) and 1 had active disease at the time of transplant. Peripheral blood stem cell apheresis were performed using Hemonetics MCS + or Cobe spectra apheresis machine using double lumen central venous catheter. Melphalan 140 mg/m² was used in 21 patients (15 due to renal impairment and 6 due to comorbidities or overall clinical state).

Median dose of HSCs infused was 2.65×10^6 /kg. Eight patients had CD 34 dose between 1.5 and 2×10^6 /kg. Grade III or IV mucositis was seen in 78% patients. All 50

patients developed febrile neutropenia. Cause for fever could be documented clinically, radiologically or microbiologically in 24 (48%) patients (Table 1). Fifteen patients developed gram negative infections. Four patients developed gram positive infection (3 MRSA and 1 staphylococcal epidermidis) during febrile episode. One patient each developed CMV reactivation after engraftment, H1N1 infection with respiratory distress and Herpes esophagitis. All 3 patients survived. One patient developed cryptosporidium diarrhea. Day 30 treatment related mortality (TRM) was nil. One dialysis dependent patient died on day 37 after primary graft failure taking our Day 100 TRM to 2%. His blood culture grew methicillin resistant staphylococcus aureus, E coli and Providencia rettgeri.

In 4 patients, response after transplant was not available because 1 had TRM and 3 progressed (1 CR and 2 PR at the time of HSCT) between day 30 and 100 days one progressed to plasma cell leukemia, one had CNS progression within 6 weeks of BMT and died. Three other patients relapsed at various time points and succumbed to that. Remission status after transplant were: patient with active disease at the time of transplant attained PR; all 3 patients with VGPR attained CR. Out of 15 patients with PR-6 attained CR, 3 VGPR, 3 PR and 3 progressed. Twelve patients relapsed of which 8 patients are on active therapy at this time.

The median follow-up time from transplant was 1.4 year (4–71 months). Age < 45 years or more and disease status at the time of transplantation did not affect survival. Overall survival of entire cohort was 86%.

It has been shown that ASCT improves quality of life and is cost effective in India compared to chemotherapy if performed early in disease course [4]. In India, patients often present to transplant centers late and have often received multiple lines of chemotherapies by then. This

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Table 1 Transplant parameters of study population

Salvage chemotherapy before HSCT	N = 13
Bortezomib/dexamethasone	2
ABCD	3
CTD	2
BCD	1
DT-PACE	2
VAD	2
Daratumumab	1
Stem cell mobilisation	N = 50
G-CSF	34
Cyclophosphamide + G-CSF	8
Plerixafor + G-CSF	5
Plerixafor + G-CSF + cyclophosphamide	1
VAD	1
DTPACE	1
CD 34 dose infused ($\times 10^6/\text{kg}$)	2.65 (1.52–17) ^a
Melphalan dose	
140 mg/m ²	21
200 mg/m ²	29
Engraftment	Median (range)
Neutrophils	11 (9–14) days
Platelets	11 (9–32) days
Infections	N = 50
Febrile neutropenia	50
Fever of unknown origin	26
Microbiologically documented infection	18
Clinically documented infection	2
Radiological (pneumonia)	1
Viral	3
Fever	4 (1–16) days
Mucositis	N = 47
Grade 2	8
Grade 3	23
Grade 4	16
Death	N = 7
Day 30 TRM	0
Day 100 TRM	1 (2%)
Progressive disease	6
Hospital stay	19 (14–61) days

NA, not available; ABCD, liposomal doxorubicin, bortezomib, cyclophosphamide, dexamethasone; BCD, bortezomib, cyclophosphamide, dexamethasone; CTD, cyclophosphamide, thalidomide, dexamethasone; VAD, vincristine, doxorubicin, dexamethasone; DTPACE, dexamethasone, thalidomide, cisplatin, doxorubicin, cyclophosphamide, etoposide; G-CSF, granulocyte colony stimulating factor; TRM, transplant related mortality

^a8 patients had stem cell dose between 1.5 and 2 million/kg

affects stem cell yield. We used plerixafor for 6 patients and stem cells could be harvested in all successfully. Kumar et al. [5] have shown success rates of 84% in patients earlier treated with lenalidomide. Gram negative infections continue to be major problem for transplant units as has been earlier documented [1, 2]. Average transplant cost for multiple myeloma at our center is Rs. 6 lakhs.

Progression after transplant is a poor prognosis feature. Larger multicentric data and longer follow up would make us wiser in making appropriate treatment decisions.

Compliance with Ethical Standards

Conflict of interest The author declares that they have no conflict of interest.

Ethical Approval The study was approved by Institutes' Ethics Committee.

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