



Better Selection of Grafts Reduces Significantly Transfusion Requirements in Patients Undergoing Umbilical Cord Blood Transplantation

Pilar Solves^{1,2*}, Inés Gómez¹, Mario Arnao¹, Jaime Sanz¹, Guillermo Francisco Sanz¹ and Nelly Carpio¹

¹Department of Hematology Service, Hospital Universitario I Politécnico La Fe, Spain

²Instituto Carlos III, Spain

Editorial

Hematopoietic Stem Cell Transplantation (HSCT) is a common treatment for patients affected by hematologic malignancies and congenital diseases of the immune system [1]. The lower number of stem cell progenitors in Umbilical Cord Blood (UCB) grafts, as compared with bone marrow or peripheral grafts produces increased risk of failure graft and delayed hematopoietic engraftment [2]. Blood product transfusion is an essential part of the supportive care in patients undergoing HSCT. Umbilical Cord Blood Transplantation (UCBT) is the HSCT modality with higher transfusion requirements, as compared to peripheral blood HSCT [3]. Delayed platelet recovery and more prolonged blood product transfusion requirements have also been described in UCBT, as compared to peripheral blood HSCT [3]. Our group has previously showed that Total Nucleated Cell (TNC) content and CD34+ cell content of grafts significantly and inversely influenced Red Blood Cell (RBC) and Platelet (PLT) transfusion independence respectively, in patients who underwent UCBT [4]. We have analysed the transfusion requirement evolution over time of patients who received an UCB, and its relationship with TNC and CD34 cell content of UCB units. All patients received myeloablative conditioning regimen based on the combination of thiotepa, busulphan, fludarabine and anti-thymocyte globulin [5]. Packed Red Blood Cells (RBCs) were transfused if the haemoglobin level of patients was <80 g/dl and Prophylactic Pooled Platelets (PLTs) were transfused at platelets counts <20 x 10⁹/L. All blood products were leukocyte-filtered and irradiated with 25 Gy. We have analysed changes over time in the cell graft characteristics and transfusion requirements during first 30 days after transplantation of patients who underwent an UCBT. For this purpose, three groups of patients have been established according to the date of transplantation (group 1 from 2000 to 2005, group 2 from 2006 to 2010 and group 3 from 2011 to 2014). Computer software SPSS (version 15, SPSS Inc., Chicago, IL) and R (version 2.1.2.2, the CRAN project) were used to perform the statistical analysis. Descriptive statistics are presented for variables. Results are expressed as median and range for continuous variables and as numbers with percentages for categorical variables. The Kruskal-Wallis test for continuous variables was used to compare the groups when applicable. A p value <0.05 was considered significant. The study reviewed 257 adult patients (160 male, 97 female, median age 38 years) undergoing UCBT for a 15-year period (2000 to 2014). Most patients were diagnosed of acute leukemia. Within the first 30 days after transplantation, 20 patients died. After a median follow-up of 1828 days (range 54 - 5399), 89 patients are alive (34.6 %). There was an inverse significant correlation between RBC requirements and TNC x 10⁶/Kg (rho =-0.201, p =0.006), and RBC requirements and CD34+ cells x10⁵/Kg (rho =-0.241, p =0.001). Table 1 show the graft cell content and transfusion requirements of different groups of patients. Over time, higher cell content of cord blood units resulting of better graft selection reduced the transfusion requirements. 158 patients (61.4 %) reached RBC transfusion independence at a median of 41 days after UCBT (range 0 - 487), while 163 patients (63.4 %) reached PLTs transfusion independence at a median of 44 days after UCBT (range 14 - 465). This difference was not statistically significant. However the number of days to reach transfusion independence has been significantly reduced over time. Our data, therefore, supports the importance of selecting higher TNC and CD34+ cell contents when choosing a cord blood unit for transplantation, especially when PLT transfusions have been associated with adverse clinical outcomes after HSCT in previous reports [6]. It has to be noticed that an optimal selection of cord blood units for transplantation benefits the patients in different ways, reducing the transfusion requirements and time to transfusion independence.

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*Correspondence:

Pilar Solves, Department of Hematology Service, Hospital Universitario I Politécnico La Fe, Avda Abril Martorell, 46026 Valencia, Spain, Tel: (96) 141 30 74 – 650438485;

E-mail: solves_pil@gva.es

Received Date: 18 Dec 2017

Accepted Date: 18 Jan 2018

Published Date: 29 Jan 2018

Citation:

Solves P, Gómez I, Arnao M, Sanz J, Sanz GF, Carpio N. Better Selection of Grafts Reduces Significantly Transfusion Requirements in Patients Undergoing Umbilical Cord Blood Transplantation. *Ann Stem Cell Res Ther.* 2018; 1(2): 1006.

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Table 1: Graft cell content and transfusion requirements to 30 days after transplantation in patients undergoing UCBT in different time periods.

Variables	2000-2005	2006-2010	2011-2014	p
Transfusion Characteristics				
n	71	108	78	
RBCC [†]	10 (2-28)	7.5 (0-26)	6 (0-28)	< 0.001
PC [‡]	22 (4-59)	21 (1-64)	16 (4-87)	< 0.001
RBC ^{***} Transfusion independence (yes/no)	42/28	71/37	45/26	0.543
PLTs Transfusion independence (yes/no)	42/28	72/36	49/22	0.424
Days to RBC Independence	60 (5-487)	36 (0-414)	31.5 (0-116)	< 0.001
Days to PLT Independence	65.5 (14-465)	46 (23-414)	35 (15-170)	< 0.001
Graft Cell Content				
TNC x 10 ⁷	16.0 (6.2-29.8)	17.7 (9.2-32.9)	21.6 (11.8-30.4)	< 0.001
TNC x 10 ⁷ /Kg	2.3 (0.9-5.7)	2.5 (1.1-5.9)	2.9 (1.6-4.5)	0.008
CD34 x 10 ⁶	7.3 (0.8-36.9)	9.7 (1.5-153.1)	15.6 (7.3-31.6)	< 0.001
CD34 x 10 ⁶ /Kg	1.2 (0.1-5.7)	1.4 (0.3-21.6)	2.0 (0.8-4.4)	< 0.001

[†]Red blood cell concentrates. [‡] Platelet concentrates. ^{***}Red blood cells

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