

PO-02

The first St. Petersburg experience of using total body irradiation as part of conditioning regimes prior to allogeneic hematopoietic stem cells transplantation in children

Maria A. Rusina ¹, Yulia V. Dinikina ¹, Alexey V. Mikhailov ^{2,3}, Svetlana I. Lapaeva ¹, Anna Yu. Smirnova ¹, Andrey S. Egorov ¹, Yulia K. Toshina ¹, Daria A. Morgacheva ¹, Nikolay A. Vorobyov ^{2,4}, Nikita A. Kataev ², Anton V. Kubasov ²

¹ Almazov National Medical Research Centre, St. Petersburg, Russia; ² LDC Dr. Berezin Medical Institute, St. Petersburg, Russia;

³ North-Western I. I. Mechnikov State Medical University, St. Petersburg, Russia; ⁴ St. Petersburg State University, St. Petersburg, Russia

Contact: Dr. Yulia V. Dinikina, phone: +7 (921) 913-22-05, e-mail: dinikina_yuv@almazovcentre.ru

Introduction

Some myeloablative total body irradiation (TBI)/total lymphoid irradiation (TLI) – based conditioning regimens prior to allogeneic hematopoietic stem cell transplantation are an effective treatment modality for some pathologic conditions. However, the issues of early and long-term toxicity, as well as some challenges in treatment planning and performance, are still a matter of debate. We aim to share our experience of interdisciplinary patient management in order to deliver these regimens. We also try to evaluate the method's toxicity and effectiveness.

Materials and methods

From June 2018 to July 2022, 15 allo-HSCTs with TBI/TLI as part of the conditioning regimens were performed in a cohort of pediatric patients with refractory/recurrent B-ALL (n= 6, 40%) and T-ALL (n=7, 46.8%), JMML (n=1), AA (n=1). CNS involvement was registered in 40% of cases. The median age was 10 (5-15) years, mean age was 9.4 years. The median follow-up period was 24.2 (18 days-48 months) months. The TBI/TLI was carried out in LDC MIBS clinic using a linear electron accelerator “Varian Clinac 2100” in Rotational Radiation Techniques mode with volumetric modulation (VMAT). The total dose for TBI/TLI was 12 Gy (single fraction dose 2 Gy given twice a day) and 4 Gy (single fraction dose 2 Gy, once a day), respectively. A relative limitation for TBI was patient's height of >160 cm, in which case the legs were bent in the knees and fixed with a vacuum mattress. Supportive therapy during the period of irradiation included infusion therapy and antiemetics.

Results

The following conditioning regimens were used: 11 cases (83.4%), TBI/Thiotepa/Fludarabine; 3 (16.6%), TBI/Melphalan/Fludarabine, and 1, TLI/Fludarabine/CyC/ATGAM. The donors were haploidentical in 12 (80%), MRD in 1 (6.7%), and MUD in 2 (13.3%) cases, respectively. GVHD prophylaxis included ATGAM/Rituximab/Abatacept in combination with TCR-aB depletion (60%), CyC/Tacrolimus/MMF (26.6%), Cyclosporine or Tacrolimus/MMF (13.4%). During the conditioning period we registered constitutional (14.3%) and neurotoxicity (14.3%), toxic hepatitis 1 grade (14.3%), and mucositis (64.3%). Infectious complications were registered in 100% of transplant recipients (80% caused by Gram-negative bacteria) with most common being enterocolitis (80%), CLABSI (13.3%), and UTI (6.6%). Reactivation of CMV infection was seen in 21.5% cases. The median time to granulocytes and platelets engraftment was 15 (9-20) and 19.5 (9-30) days, respectively. Acute

GVHD was registered in 40% of cases with most common being cutaneous (28.6%) and intestinal (21.5%) forms, 1 case was refractory. The 2-years OS and EFS comprised 57.1% and 3-months HSCT-associated mortality was 21.4%. No long-term complications were registered during the indicated follow-up period.

Conclusions

TBI/TLI conditioning regimens were well tolerated with low incidence of early as well as delayed toxicity and are feasible in St. Petersburg hospitals. Based on results obtained it is possible to recommend the method in routine practice to patients with appropriate clinical indications. Further studies are needed in order to evaluate TBI-containing conditioning regimens effectiveness and toxicity in comparison to other regimens.

Keywords

Total body irradiation, allo-HSCT, children, hemoblastoses, radiation therapy.