Outcomes of Blinatumomab the Initial Phase of Chemotherapy in Children with B-Cell ALL: A Single Center Study

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Introduction

Blinatumomab, a bispecific T-cell activator, has been recognized as an effective drug for patients with MRD-positive B-cell ALL. It is known that minimal residual disease (MRD) positivity after induction remains a serious problem, often leading to a poor prognosis.

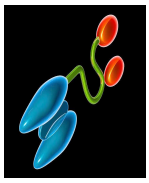
Aim

This study evaluates the efficacy of adding blinatumomab to the ALL-MB-2015 protocol regimen with asparaginase and low-dose methotrexate in children with post-induction MRD-positive B-ALL.

Objectives

We retrospectively analyzed 25 children with ALL treated between 2020 and 2024. Patients were treated with blinatumomab for MRD positivity post-induction intensive chemotherapy (n=25).

Methods



Outcomes measured included MRD status post-induction and after 14-day course blinatumomab, relapse, survival, and other clinical parameters. MRD status was measured by immunophenotyping

Results

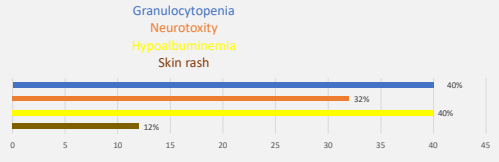
Adding 14 day course blinatumomab twice significantly improved post-induction MRD positivity (from 12% to 0,001% after blinatumomab usage).

The study included patients with morphological remission in bone marrow with blasts less than 5%, including 2 patients with incomplete induction chemotherapy. These patients received only 2 injections of vincristine, then due to severe infectious complications of fungal etiology, chemotherapy was canceled. These patients were transferred to consolidation therapy after the 1st course of blinotumomab. During treatment with blinotumomab, all patients were premedicated with dexamethasone, allergic reactions in the form of skin rash were observed in 3 patients, transient neurotoxicity not requiring intensive care was observed in 8 patients, hypoalbuminemia was observed in 10 patients (was required correction by administration of albumin). In the 1st week of administration were observed leukopenia (leukocytes below 3 thousand), granulocytopenia (granulocytes less than 1000) without the development of infectious complications in 10 patients (Picture 1). There was no need for transfusion of blood components. All patients continued consolidation and reinduction courses according to the protocol with low-dose of methotrexate. After 2 months, the 14-day course of blinotumomab was repeated. All patients remain MRD-negative.

Table 1. Patient characteristics

n	25
Sex, m/f	16/9
Age	4.1 years (range 4.0–17 years)
Immunophenotype by EGIL	
BI-ALL	1
BII-ALL	23
BIII-ALL	1
Chromosomal aberration	25/19 (76%)
t(12;21) (p13;q22)/ETV6::RUNX1	6
t(1;19) (q23;p13)/TCF3::PBX1	3
KMT2A rearranged	2
Hyperdiploid	6
Hypodiploid	2
Initial WBC (×10⁹/L)	
<10	10
10≤WBC<30	11
≥30	4
Spleen (cm below costal margin)	
<4	20
≥4	5
Risk group	
SR	5
IMR	17
HRG	3
MRD<1 (0,01-1)	22
MRD>1	3

Picture 1. Adverse events of blinatumomab.



Summary

The addition of blinotumomab to post-induction chemotherapy improved the prognosis of the disease in patients and allowed continuing chemotherapy according to the protocol. The addition of blinotumomab courses to initial chemotherapy requires further studies and longer observations

Discussion

There was no need for transfusion of blood components. All patients continued consolidation and reinduction courses according to the protocol with low-dose of methotrexate. After 2 months, the 14-day course of blinotumomab was repeated. All patients remain MRD-negative.

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