Patients with AML on programmed polychemotherapy with secondary immunodeficiency syndrome: the role of functional hypogammaglobulinemia

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Objective

The initial stages of the disease (screening and induction therapy) are very often accompanied by the development of infections complications in adult patients with acute leukemia. It is known that the main position in the development of the secondary immunodeficiency syndrome is occupied by the insufficiency of cellular immunity as a result of replacement of hematopoiesis by blast cells. And there is no sufficient assessment of the role of humoral immunity (functional hypogammaglobulinemia) in the development of infections episodes.

Methods

The study included 7 adult patients with AML in attack 1 who received specific treatment: induction chemotherapy course under the "7 + 3".

3 patients died during cytopenia from infectious complications. The intervention group (infectious episodes during cytopenia) and the control group were matched by demographics, clinical characteristics and laboratory tests were not statistically different (p > 0.05). For the primary outcome in the analysis, the decrease in the level of Immunoglobulin G (IgG) from screening indicators was taken.
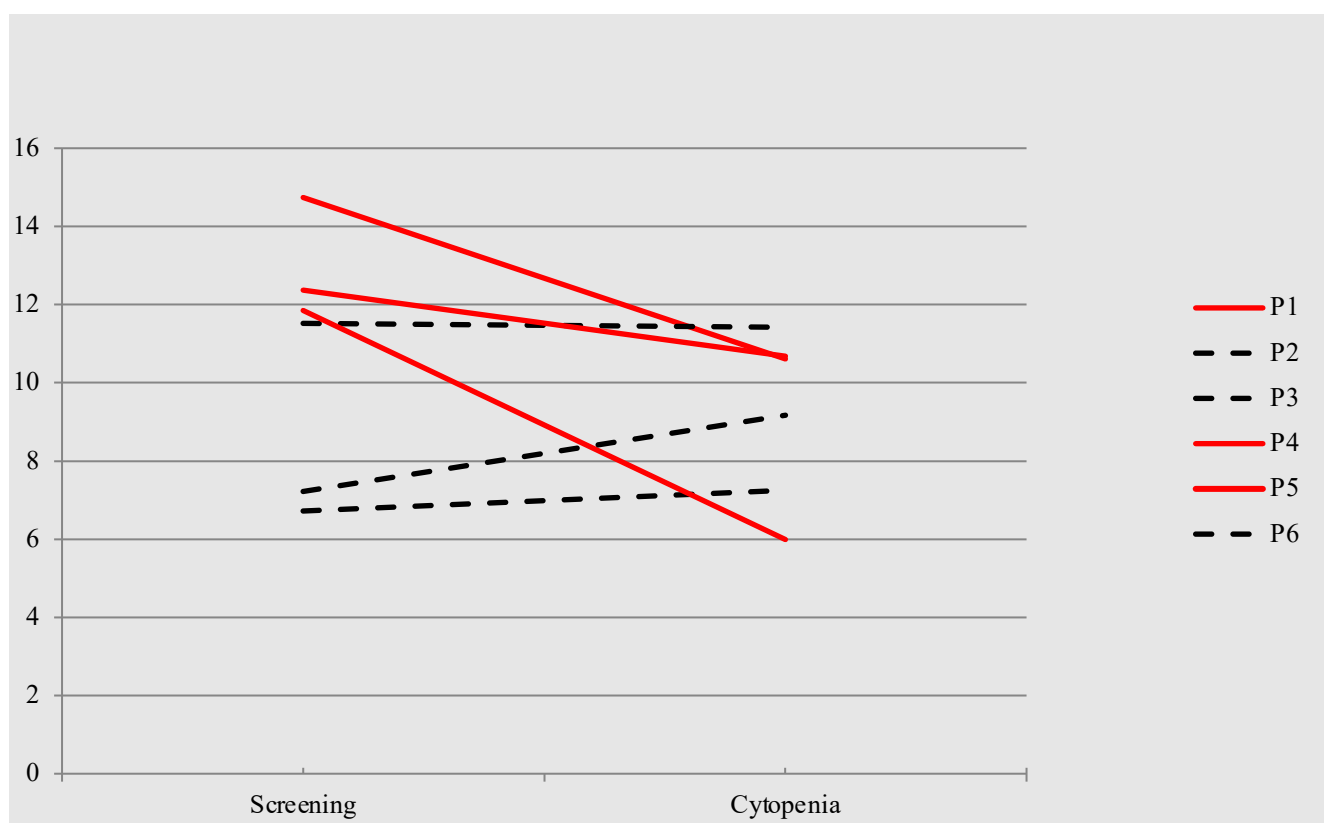

Graph 1. Levels of immunoglobulins G at control stages in patients

Parameter	Total number N=30	Control group, N=4	Intervention group N=3
Age	41.1	43.8	37.7
Sex:			
- female	4	1	3
- male	3	3	-
Nosology:			
- AML (M0)	2	1	1
- AML (M2)	2	-	2
- AML (M3)	1	1	-
- AML (M5)	2	2	-
Infectious complications:			
- pneumonia (bacterial and fungal)	1	1	-
- bloodstream infection	1	1	-
- Covid-19	3	3	-
Status:			
- alive	4	1	3
- died	3	3	-

Table 1. Baseline characteristics of patients in the control group and the comparison group.

Results

Among total study subjects, 4 patients experienced infectious episodes during cytopenia. The average value of the level of IgG at the screening stage in the group with the development of infectious episodes 12.49 [95% CI: 9.6 – 15.4] vs Infection-free group – 8.48 [95% CI: 5.26 – 11.7]. The average value of the level of IgG during cytopenia in the group with the development of infectious episodes 8.43 [95% CI: 5.63 – 11.2] vs infection-free group – 9.31 [95% CI: 6.08 – 12.5]. In the comparison group, the IgG level was statistically significantly reduced during the period of cytopenia against the background of an infectious episode in comparison with the initial values in screening – lower than in the control group (delta IgG level 4.08 vs delta IgG level 0.83; p = 0.01).
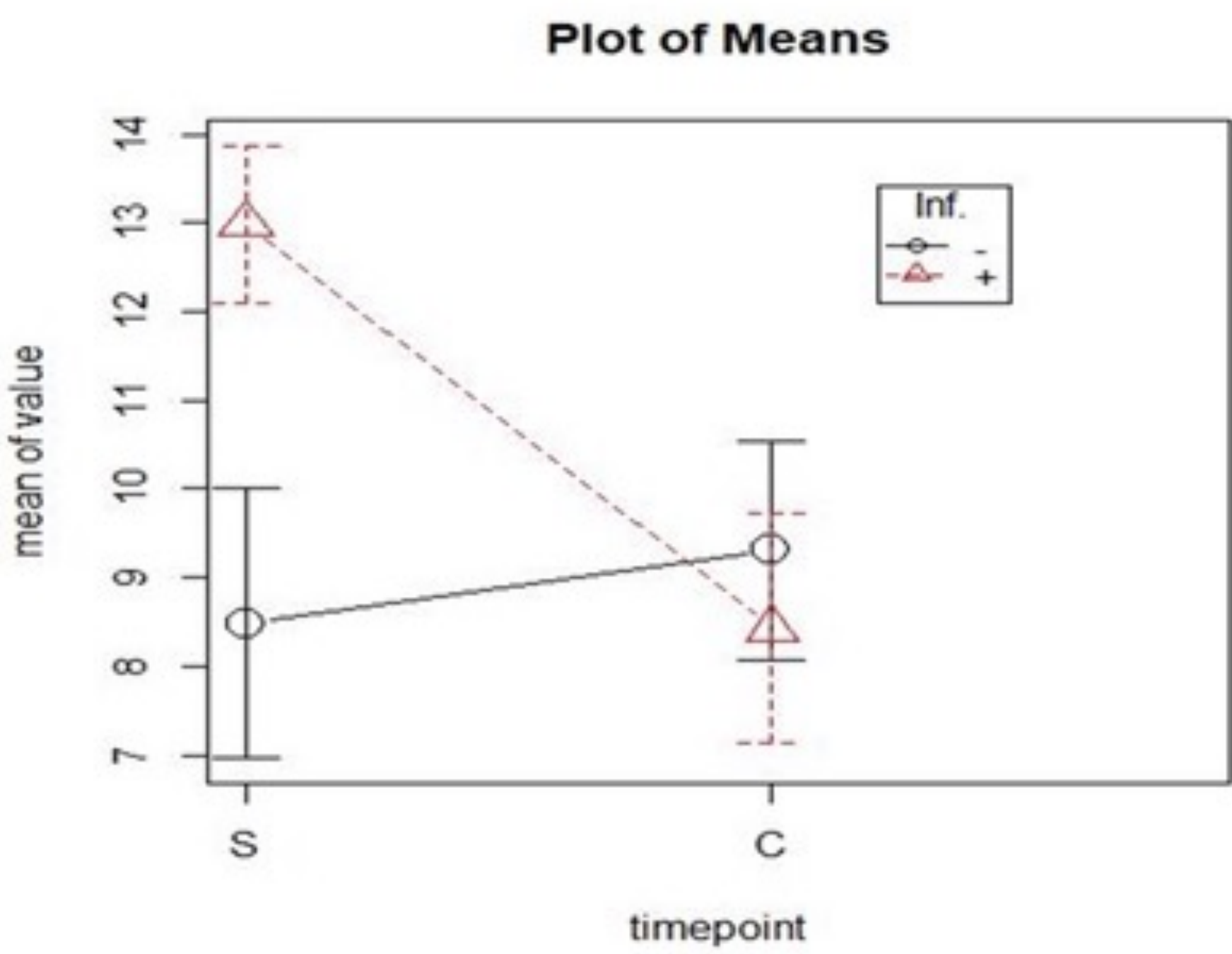
Graph 2. Changes in delta IgG levels at control points in patients

Conclusions

The suppression of humoral immunity takes place (violation of the functional activity of gammaglobulins). Which plays a significant role in the development of infections episodes in patients with acute myeloid leukemia. As a result, replacement therapy with immunoglobulin at the stages of induction therapy can be a predictive prevention of infectious episodes.

Key words

infections in hematology, acute leukemia, immunoglobulin, functional hypogammaglobulinemia