

ALLOGENIC BONE MARROW TRANSPLANTATION IN CHILDREN: EFFECT ON THYROID FUNCTION

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Background

Children and adolescents who have Allogenic Bone Marrow Transplantation is the treatment of choice for a number of malignant conditions as well thalassemia major, aplastic anemia and immunodeficiencies. A number of endocrine sequelae have been recognized

Objective

To report on the incidence of thyroid dysfunction of patients who underwent bone marrow transplantation during childhood or adolescence

Methods

82 patients (56 boys) who were transplanted from an HLA matched donor at a mean age of 7.5 ± 4.8 years (range 0.18-17.5 years) were followed prospectively having measurements of fT4, TSH twice yearly, using chemiluminescence

Patients with elevated TSH higher than $8 \mu\text{IU/ml}$ had a repeat evaluation in a month time.

Thyroid sonogram was performed yearly in patients who have received radiation therapy (RT) and at least once in patients with no history of RT.

The initial diagnosis included acute lymphocytic leukemia (ALL), acute myelocytic leukemia, thalassemia, Fanconi anemia, aplastic anemia and severe combined immunodeficiency. The conditioning regimen consisted of Busulfan(16mg/Kg) + Cyclophosphamide(200mg/Kg) +/- Fludarabine(100mg/m^2) and antithymocyte globulin

Four patients received total body irradiation (TBI). Seven patients received CNS prophylaxis with 12 Gys for all.

Results

The age of the last evaluation was 11.97 ± 5.17 yrs and the years post BMT were 4.47 ± 3.24 .

Fifty patients (60.9 %) patients had **normal thyroid function**.

Twenty five patients (30.4%) had **primary hypothyroidism** as evidenced by TSH levels higher than $8 \mu\text{IU/ml}$ and low or low normal fT4 levels verified with a second measurement and they were started on replacement therapy with L-thyroxine.

One patient had TSH higher than $10 \mu\text{IU/ml}$ which returned to normal and she has normal thyroid function up to now.

Among the patients with hypothyroidism 2 had received TBI and 3 had received 12Gys RT.

Four patients (4.8 %) had **compensated hypothyroidism** as evidenced by TSH level range greater than 5 and less than $8 \mu\text{IU/ml}$. None of them had progressed so far to overt hypothyroidism.

One patient with a history of TBI, borderline elevation of TSH and low fT4 was considered to have central hypothyroidism and he was started on replacement therapy.

One of the hypothyroid patients who had received TBI had a **thyroid nodule** for which he had an FNA, consistent with a dysplastic nodule BETHESDA 1

One of the normothyroid patients who had also received TBI had **papillary Ca** and underwent thyroidectomy.

	First Evaluation	Last Evaluation
Mean age	7.5 ± 4.8	11.97 ± 5.17
Years post-BMT		4.47 ± 3.24

	Normal Thyroid Function	TSH < 8 Replacement therapy	TSH > 10 No Therapy	5 < TSH < 10 No Therapy	Thyroid Nodule	Papillary Ca (Normal Function)
No of patients	50 (60.9%)	25 (30.4%)	1 (1.22%)	4 (4.8%)	1 (1.22%) Bethesda 1	1 (1.22%)
TBI		2			1	1
CNS prophylaxis		3				

Conclusions

Thyroid dysfunction is quite common complication of BMT in this pediatric population. The exact mechanism is not clear.

Patients who have received radiation prior to BMT are at increased risk.

Patients who underwent BMT should have evaluation of thyroid function routinely in order to prevent overt hypothyroidism.

References

Katsanis et al Thyroid dysfunction after bone marrow transplantation Long term follow up of 80 pediatric patients Bone Marrow transplant 1990 335-40