Case Report

Graves' Disease-Related Pancytopenia Improved after Radioactive Iodine Ablation

Omnia A. Hamid^a Afraa M. Fadul^b Tala B. Batia^a Mohamed A. Yassin^b

^aDepartment of Medical Education, Hamad Medical Corporation, Doha, Qatar; ^bDepartment of Medical Oncology, National Center of Cancer Care and Research, Hamad Medical Corporation, Doha, Qatar

Keywords

Anemia · Thrombocytopenia · Hyperthyroidism

Abstract

Graves' disease is an autoimmune disease that affects the thyroid glands which often results in enlarged thyroid glands, and it is the most common cause of clinical hyperthyroidism especially in young patients. Radioiodine ablation is a radiation therapy in which radioactive iodine is administered to destroy or ablate thyroid cells. It is commonly used for the treatment of Graves' disease. We report on a 39-year-old male, who presented with Graves' disease, found to have pancytopenia and hypocellular bone marrow. Pancytopenia is a rare complication of thyrotoxicosis that is usually not severe and does not require supportive blood product transfusions. Our patient was treated with antithyroid medications followed by radioactive iodine ablation followed by a spontaneous recovery of pancytopenia.

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Introduction

Graves' disease is an autoimmune disease characterized by hyperthyroidism due to circulating autoantibodies. Thyroid-stimulating immunoglobulins bind to and activate thyrotropin receptors, causing the thyroid glands to grow and the thyroid follicles to increase synthesis of thyroid hormones. Graves' disease along with Hashimoto thyroiditis are classified as autoimmune thyroid disorders.

Dr. Omnia A. Hamid
Department of Medical Education
Hamad Medical Corporation
PO Box 3050, Doha (Qatar)
OHamid@hamad.qa

In some patients, Graves' disease represents a part of more extensive autoimmune processes leading to the dysfunction of multiple organs (e.g., polyglandular autoimmune syndromes). Graves' disease is associated with pernicious anemia, vitiligo, diabetes mellitus type 1, autoimmune adrenal insufficiency, systemic sclerosis, myasthenia gravis, Sjögren syndrome, rheumatoid arthritis, and systemic lupus erythematosus [1].

Case Presentation

We report on a 39-year-old Filipino man who presented to our facility with a 2-week history of headache, easy fatigability, and on-and-off gum bleeds that stopped spontaneously associated with palpitation tremors and unintentional weight loss. He had a history of hypertension diagnosed 2 years ago. Upon presentation, the patient was conscious, alert, oriented, afebrile, and vitally stable. He seemed slightly pale but without signs of thyroid eye disease. His neck exam showed enlarged thyroid glands but no palpable lymphadenopathy. His hands were sweaty moist and warm with coarse upper-extremity tremors. His chest abdomen and neurological exams were all normal. His blood works and peripheral smear were suggestive of pancytopenia with severe macrocytic anemia and reticulocytopenia.

The patient's initial blood test results showed a hemoglobin level of 5.5 g/dL (lab reference range: 13–17), his white blood cell level was 2.2×10^3 U/L (reference range: $4\text{--}10 \times 10^3$), and his platelet count was 30×10^3 U/L (reference range: 150–400).

Other lab works, including iron profile, folate, vitamin B₁₂, haptoglobin, lactate dehydrogenase, and liver function test, were normal. Hepatitis B and C virus, HIV screen, parvovirus B19 serology, and autoimmune disease work-up were done as part of the pancytopenia work-up, all returned normal. CT of the chest/abdomen and pelvis with contrast showed no organomegaly evidence of malignancy. Peripheral blood smear showed severe macrocytic anemia with anisopoikilocytosis including scattered macrocytes, ovalocytes, tear drop target cells, some spherocytes and schistocytes, basophilic stippling, and few polychromatic cells. We found leukopenia with moderate neutropenia, mild toxic features, few and reactive lymphocytes, and severe thrombocytopenia. Bone marrow exam suggested hypocellular bone marrow with low numbers of megakaryocytes and decreased granulopoiesis with orderly maturation up to the segmented stage. Blast cells were 3%. Erythropoiesis appeared active with a mixture of normoblastic and megaloblastic maturation. No significant dysplasia was found, normal cytogenetics and no increased blast cells.

The patient was started on supportive transfusions with packed red blood cells and platelets. He required almost weekly transfusions. Then, the patient was started on cyclosporin 125 mg BID daily. During his hospital stay, the patient was found to have hyperthyroidism with suppressed TSH of <0.01 mIU/L (reference range: 0.45–4.50) T4 45.4 pmol/L (9–20), T3 15.35 pmol/L (2.6–5.7), and anti-TBO (thyroid peroxidase negative and anti-thyroglobulin antibody negative). A scan of his thyroid glands showed diffuse uptake suggestive of Graves' disease. The patient was started on propranolol and methimazole, but he was not compliant with his medications so radioactive iodine ablation was done. After which the patient became hypothyroid and was started on levothyroxine replacement 100 µg daily.

After radioactive iodine ablation and thyroid disease control, the patient's red blood cell and platelet transfusion requirement markedly decreased, and his blood counts improved. Cyclosporine was gradually tapered until it was completely stopped after 16 months. Currently, our patient does not require any red blood cell or platelet transfusions. His anemia symptoms have resolved. His follow-up includes close blood count monitoring. During his most recent follow-up, he had a hemoglobin level of 15 g/dL, white blood cell

count of 5.4, and platelet count of 38. Repeat bone marrow exam after 2 years of diagnosis suggested cellular bone marrow with trilineage hematopoiesis and areas of reduced cellularity.

Discussion

Our patient suffered from Graves' disease with pancytopenia and hypocellular bone marrow that required platelet and packed red blood cells transfusions. After achieving an euthyroid state with radioactive iodine ablation, the patient's pancytopenia resolved as proven by repeat bone marrow biopsy, and he is no longer requiring blood product transfusions anymore.

The hematopoietic system is greatly affected by the thyroid state, and thyrotoxicosis-induced changes can affect all three hematopoietic cell lineages. The most common presentation is anemia [2]. Pancytopenia has been reported in few cases in the literature, and most cases were related to Graves' disease, but they are not usually catastrophic [3]. The mechanism behind these hematological changes is not fully understood but most likely attributed to an immunologic response and stem cell dysfunction rather than excess thyroid hormones [4, 5].

In most cases, pancytopenia related to thyrotoxicosis responds well after control of the thyroid disease, and in most reports, such pancytopenia is not a contraindication for starting antithyroid medications.

Conclusion

Graves' disease with pancytopenia is reported in few cases in the literature. Most of the patients were reported to have non-severe pancytopenia and did not require supportive blood product transfusions, and their pancytopenia markedly improved after thyroid disease control with antithyroid medications or radioactive iodine ablation. As per literature review, pancytopenia is not a contraindication for antithyroid medications.

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Statement of Ethics

This case was approved by the Hamad Medical Corporation's Medical Research Center, and the patient consented to the publication of his case.

Disclosure Statement

The authors have no conflicts of interest.

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Authors Contributions

Dr. Hamid and Dr. Yassin wrote and edited the manuscript. Dr. Fadul was in charge of clinical care.

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