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Case Report

Gaucher's disease with acute lymphoblastic leukemia: A rare co-occurrence

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ABSTRACT

A positive correlation between Gaucher's disease and hematological malignancies has been suggested in the past three to four decades through various studies. There have been reports suggesting the occurrence of cancers such as multiple myeloma, acute leukemia and chronic myeloid leukemia, and hepatocellular carcinoma in patients with Gaucher's disease. A 1½-year-old female child presented with a complaint of a slowly growing lump in the left upper abdomen. On subsequent history taking and investigations, a concomitant presence of Gaucher's cells and leukemic cells (blasts) was found in the bone marrow aspiration and biopsy. A possible correlation, akin to the previous literature, between Gaucher's disease and acute leukemia, is suggested.

Keywords: Gaucher's disease, acute leukemia, B-ALL, Storage disorder

INTRODUCTION

Gaucher's disease is a rare and autosomal recessive sphingolipidosis. It is the most common lysosomal storage disorder.[1] A congenital deficiency of beta-glucocerebrosidase results in the accumulation of glucocerebroside in the organelles, mainly in the lysosomes and in the late endosomes of the macrophages (known as Gaucher cells).[2] The macrophages have a histological appearance similar to that of a "crumpled tissue paper." This appearance is due to the accumulation of lysosomes filled with the non-metabolized glucocerebroside.[3] This leads to the enlargement of the organs, in which the macrophages accumulate. The most common organs involved are bone marrow, spleen, liver, and rarely lymph nodes.[2] Hence, the patient usually presents with organomegaly with or without other constitutional symptoms.

Gelfand and Gribroff, 1961, first suggested an association between Gaucher disease and acute leukemia.[4] The chronically and alternatively activated Gaucher cells secrete several pro-inflammatory and anti-inflammatory cytokines and chemokines, leading to a disturbed cellular and cytokine microenvironment.[5] An alternative hypothesis links the decrease in ceramide with the survival of cancer cells. Ceramide, which is a product of glucocerebrosidase activity, is a strong tumor suppressor and strengthens the signals initiating apoptosis, autophagy, and cell cycle arrest. Thus, a decrease in ceramide contributes to the prolonged survival of the tumor cells.[6]

CASE REPORT

A 1½-year-old female child, Hindu by birth, presented to the pediatrics OPD with a gradually increasing lump in the left hypochondrium. On physical examination, the baby was anemic

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and had massive splenomegaly on examination. She had no other significant physical findings. On complete blood count, Hb was 7.8 g/dl, platelet was 95,000/ul, and white blood cell count was 5060/ul. The peripheral blood smear revealed microcytic hypochromic red blood cells (RBCs) with the presence of a few pencils shaped and teardrop RBCs. Leukocyte distribution was normal, no atypical cells or immature cells were noted, and there was a mild reduction in the platelet count. The serum iron studies and hemoglobin high-performance liquid chromatography (Hb-HPLC) were done. Serum iron was 24 ug/dl and transferrin saturation was 7.4%. Hb-HPLC was normal. The computed tomography scan and USG confirmed huge splenomegaly, and the liver was also enlarged in size ~ 11.8 cm in craniocaudal span.

The patient was initially started on iron therapy and no significant response was seen. Given massive splenomegaly and hepatomegaly, a bone marrow aspiration and biopsy were planned. On aspiration, there was a dry tap and imprint smears revealed occasional cells with morphology similar to Gaucher cells. Along with this, there were sheets of atypical small round cells. These atypical small round cells had a high nucleocytoplasmic ratio, monomorphic nuclei, fine chromatin with inconspicuous nucleoli, and very scant cytoplasm. Bone marrow trephine biopsy showed ~100% cellularity with sheets of immature cells with sheets of Gaucher cells with crumpled tissue paper-like abundant eosinophilic cytoplasm [Figure 1]. Based on this morphological picture, a provisional diagnosis of storage disorder, probably Gaucher's disease with acute leukemia, was made. Immunohistochemistry was performed to further categorize the lineage of these atypical round cells. On immunohistochemistry, these small round blue cells were CD79a, CD 10, and terminal deoxynucleotidyl transferase positive, whereas negative for CD99 and CD3 [Figure 2]. Hence, the case was diagnosed as a storage disorder, favoring Gaucher's disease with acute precursor B-cell lymphoblastic leukemia. The possibility of the storage cells being pseudo-Gaucher cells was ruled out given the presence of massive splenomegaly. A special stain for iron was not possible due to a dry tap.

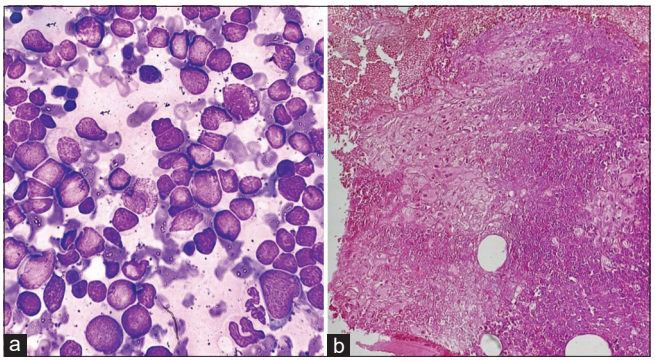

Figure 1: Imprint smear (× 1000) shows an increase in blasts with reduced trilineage hematopoiesis with few normoblasts, myeloid precursors, and mature neutrophils (a). Bone marrow biopsy shows (×200) hypercellular marrow with sheets of macrophages with "crumpled tissue paper"-like eosinophilic cytoplasm. There are also sheets of immature appearing cells in between these sheets of Gaucher cells (b).

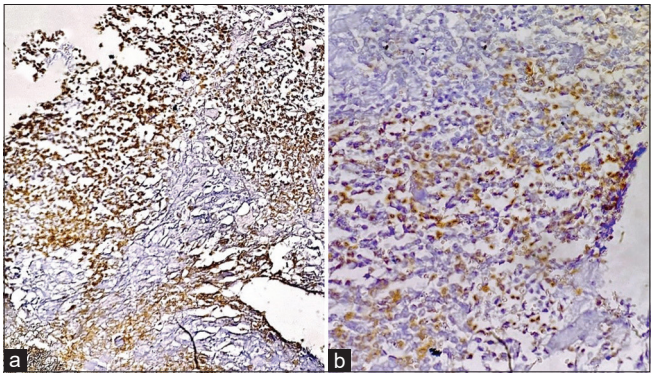

Figure 2: The leukemic blast cells are immunoreactive for terminal deoxynucleotidyl transferase (a). Leukemic blasts are positive for CD79a (b).

DISCUSSION

There is a rising number of evidence indicating the increased risk of cancer development in association with congenital metabolic errors[1] and our case adds to the same. In such cases, the pathogenesis of hematological malignancies is described by the progressive glucocerebroside accumulation causing chronic antigenic stimulation resulting in lymphoproliferation and impaired cellular immunity.[7] The presence of Gaucher-like cells is well documented in patients with chronic myeloid leukemia[4] and diseases with a high cellular turnover such as thalassemia and congenital dyserythropoietic anemia Type II.[7] Many case reports are there showing the cooccurrence of Gaucher's disease with multiple myeloma but only limited reports of the cooccurrence of acute lymphoblastic leukemia and Gaucher's disease in young children are there.

CONCLUSION

This case shows the importance of morphological detection of the malignant counterpart which is acute lymphoblastic leukemia, which may be masked by the overwhelming presence of Gaucher cells, and also demonstrates the importance of good aspirate and imprint smears and an adequate biopsy.

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Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

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Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Wątek M, Piktel E, Wollny T, Durnaś B, Fiedoruk K, Lech-Marańda E, *et al*. Defective sphingolipids metabolism and tumor associated macrophages as the possible links between gaucher disease and blood cancer development. Int J Mol Sci 2019;20:843.
2. Cappellini MD. A rare condition in haematological practice-Gaucher disease. Eur Oncol Haematol 2015;11:15-20.
3. Mistry PK, Taddei T, vom Dahl S, Rosenbloom BE. Gaucher disease and malignancy: A model for cancer pathogenesis in an inborn error of metabolism. Crit Rev Oncog 2013;18:235-46.
4. Corbett GM, Darbyshire PJ, Besley GT, Parker AC. Adult gaucher disease in association with acute leukaemia. Postgrad Med J 1987;63:899-900.
5. Boven LA, van Meurs M, Boot RG, Mehta A, Boon L, Aerts JM, *et al*. Gaucher cells demonstrate a distinct macrophage phenotype and resemble alternatively activated macrophages. Am J Clin Pathol 2004;122:359-69.
6. Morad SA, Cabot MC. Ceramide-orchestrated signalling in cancer cells. Nat Rev Cancer 2013;13:51-65.
7. Shiran A, Brenner B, Laor A, Tatarsky I. Increased risk of cancer in patients with Gaucher disease. Cancer 1993;72:219-24.

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