A Case of T-Cell Acute Lymphoblastic Leukemia after Treatment of Acute Promyelocytic Leukemia

P. C. Bee, G. G. Gan, J. V. Sangkar, A. Teh, K. Y. Goh

Department of Medicine, Faculty of Medicine, University Malaya, Kuala Lumpur, Malaysia

Received February 2, 2003; received in revised form November 10, 2003; accepted January 12, 2004

Abstract

We diagnosed T-cell acute lymphoblastic leukemia (T-ALL) with multiple cytogenetic abnormalities in a 17-year-old girl a year after she had received a diagnosis of acute promyelocytic leukemia (APML). After the diagnosis of APML in June 2001, the patient was treated with idarubicin and all-trans-retinoic acid. In September 1999, her younger sister also received a diagnosis of APML and to date has remained well. T-ALL after remission of APML is very rare, and only 1 such case has been reported. Possible causes include therapy-related reasons, genetic susceptibility to leukemia, and environmental exposure.

©2004 The Japanese Society of Hematology

Key words: Therapy-related leukemia; T-cell acute lymphoblastic leukemia; Acute promyelocytic leukemia; Familial leukemia

1. Introduction

Therapy-related leukemias account for approximately 20% of all secondary malignancies and consist mostly of acute myeloblastic leukemia (AML). These leukemias are usually associated with chemotherapy agents such as topoisomerase II inhibitor drugs, intercalating agents, and alkylating agents.

We report a case of acute lymphoblastic leukemia (ALL) that occurred 1 year after the patient was treated with DNA topoisomerase II inhibitor (idarubicin) for her de novo acute promyelocytic leukemia (APML). However, cytogenetic analysis of the marrow revealed no MLL gene rearrangement. Rearrangement of the MLL gene is usually characteristic of therapy-related leukemia induced by DNA topoisomerase II inhibitors. It is also worthwhile to note that a younger sister of this patient had APML at the age of 10 years and underwent successful treatment. We propose that familial leukemia may be due to a genetic predisposition or to exposure to unknown environmental factors.

2. Case History

V. was a 17-year-old Chinese girl who presented in June 2001 with easy bruising, spontaneous gum bleeding, prolonged low-grade fever, and significant weight loss. A film of her peripheral blood showed anemia, thrombocytopenia, and leukocytosis (20 × 10⁹/L) with 88% blasts. A physical examination revealed mild hepatomegaly but no splenomegaly or lymphadenopathy. A bone marrow examination was done, and a diagnosis of APML was made from the results of immunophenotyping studies, biochemical staining, and an evaluation of blast cell morphology. The immunophenotype was positive for myeloid markers (CD13, 70.2%; CD33, 99.6%; CD45, 91.2%) and was negative for lymphoid markers (CD3, 0.8%; CD7, 0.4%; CD5, 0.7%; CD20, 0.2%; CD19, 0.2%; CD22, 0.2%; CD10, 0.0%) as well as for HLA-DR (0.7%) and CD34 (3.7%). Unfortunately, no cytogenetic results were available. However, a fluorescence in situ hybridization (FISH) analysis of the marrow was performed, and the detection of a PML-RARα fusion gene signal further confirmed the diagnosis of APML. We also note that the patient's younger sister had APML diagnosed 2 years earlier. The sister is currently in remission.

We treated the patient with all-trans-retinoic acid (ATRA) and 3 courses of idarubicin (total cumulative dose, 80 mg), and she achieved complete remission. A FISH