Acute Lymphoblastic Leukemia with t(4;11) in a Patient Previously Exposed to a Carcinogen

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ABSTRACT: *A case of early B t(4;11)(q21;q23) acute lymphoblastic leukemia (ALL) with low white blood cell (WBC) count, without splenomegaly, short survival time, in a patient previously exposed to benzol is presented. We discuss the relationship between the t(4;11)(q21;q23) and the exposure to a carcinogen.*

INTRODUCTION

Translocation (4;11)(q21;q23) is a consistent finding in a specific subgroup of patients with acute lymphoblastic leukemia (ALL) [1–7]. Fewer than 80 cases have been studied so far.

Taking into account the age distribution, Kocova et al. [1] proposed two categories: 1) an infantile type (patients aged less than 16 months) and 2) a type occurring in patients aged more than 11 years, most of whom were adults. So far, reports of only four patients with ALL with a t(4;11) and a previous exposure to carcinogens have been published [8–10]. We describe a patient with early B t(4;11)(q21;q23) ALL with a low white blood cell (WBC) count, without splenomegaly, and short survival time, who had previously been exposed to a carcinogen.

CASE REPORT

A 55-year-old female was referred on January 18, 1989 for hematomas and bruises. The patient had been a furniture worker for 35 years and 22 years ago had had benzol intoxication for 3 months. Her white blood cell (WBC) count was 20.4×10^9/L; hemoglobin was 10 g/100 ml, hematocrit was 27, and platelet count was 37.0×10^9/L. The differential on peripheral blood showed 81% blasts of L2 morphology (French-American-British classification) [11]. Immunophenotyping on peripheral blood showed: TdT+, CALLA$^-$, HLA–DR$^+$, CD19$^+$, CD 20$^+$, CD 3$^-$, and SmIg + (4%).

Ultrastructural examination of cells showed a very immature nucleus with abundant euchromatin and few nuclear pockets, scarce lysosomes, and multivesicular bodies. Some bundles of microfilaments and strands of rough endoplasmic reticulum

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were also evident. No myeloproliferative reaction product was noted either in granules or in the perinuclear cistern and rough endoplasmic reticulum. No lymphadenopathy or splenomegaly was detectable. These results were consistent with an early B-cell ALL.

The patient was treated with the protocol for adult ALL, but a remission was not obtained. She died of septic shock 1 month after diagnosis of her leukemia during therapy-induced aplastic phase.

MATERIAL AND METHODS

The bone marrow aspirate did not yield sufficient material; therefore, peripheral blood was processed after a 24-hour culture. Air dried preparations were made and routinely stained for G banding with Wright stain.

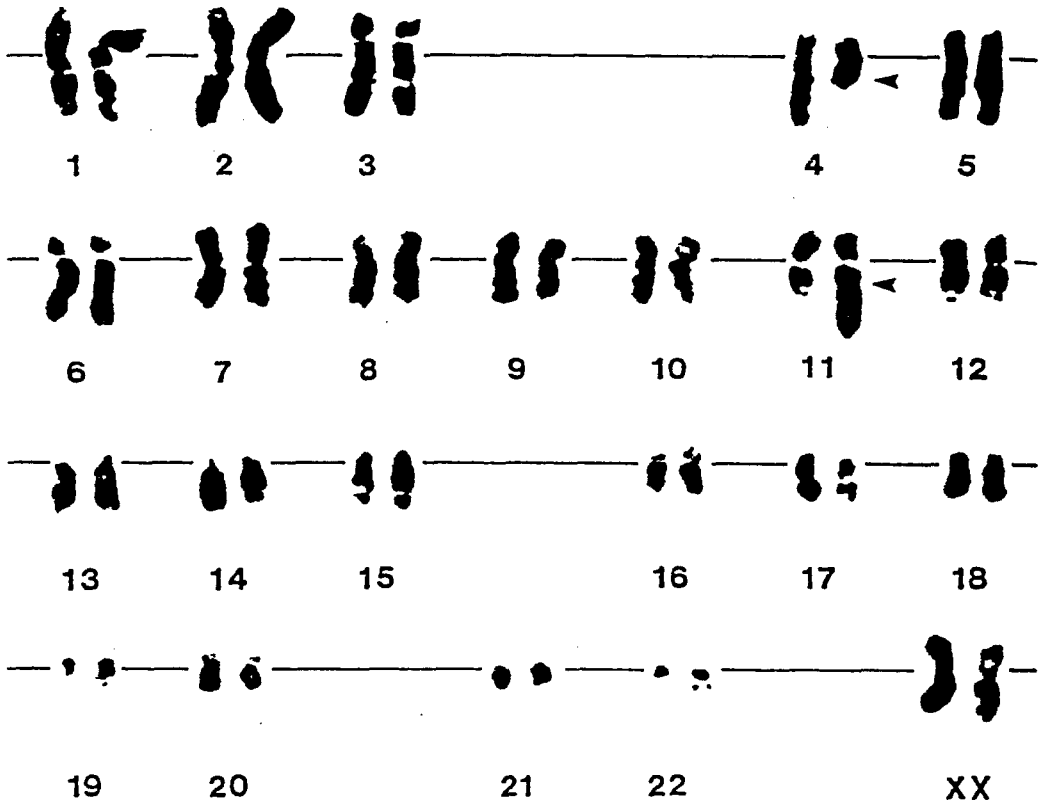
RESULTS

Karyotypic analysis was made at diagnosis before initiation of therapy. Seven metaphases examined showed the karyotype 46,XX,t(4;11)(q21;q23) (Fig. 1).

DISCUSSION

Patients with t(4;11) share several clinical and laboratory findings, including a high WBC count at diagnosis (mean value 269 × $10^3/\mu L$), an ALL immunophenotype, splenomegaly, a relatively short remission duration, and short survival time [1–7].

Figure 1 Karyotype showing t(4;11)(q21;q23).



Clinical and biological characteristics of our patient were similar to those described in the literature for primary malignancies except for the low WBC and the absence of splenomegaly. Nonetheless, the outcome was very poor, suggesting that the t(4;11) per se confers a very poor prognosis.

The role of carcinogens has recently been suspected in the occurrence of more mature lymphoid malignancies [12, 13], although very few cases of secondary ALL have been described [14–18]. To our knowledge, t(4;11) has been reported in only four patients previously exposed to carcinogens; one exposed to chemotherapy [8], two treated with radiochemotherapy [9, 10], and one occupationally exposed to radiation [10]. Recently, a t(4;11) was described in a patient with a therapy-related myelodysplastic syndrome [19].

The relationship between exposure to benzol and leukemia in our patient is questionable, since the delay in the occurrence of the leukemia after the exposition is longer than the average in previously reported cases (1–10 years).

All these results suggest that knowledge of the history of exposure to carcinogens in adult patients, as well as in parents of infants with leukemia, could be very beneficial. The history of exposure to carcinogens should be carefully investigated in t(4;11) ALL patients to determine if this abnormality could be a secondary change. Because the breakpoint 11q23 may be important in development of acute leukemias [20] and because t(4;11) may be induced by mutagens [8–10], the breakpoint 11q23 may correspond to a "hot" spot.

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