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Case Report

Trisomy 6 as the sole stemline abnormality in a patient with acute monocytic leukemia: a case report

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Abstract: It is rare for trisomy 6 to occur as the sole autosomal anomaly in hematological malignancies, but this finding has been reported to be associated with a hypoplastic bone marrow. We report the case of a 75-year-old male with acute monocytic leukemia, in which trisomy 6 was detected as the sole stemline abnormality. We also summarize the 26 published cases of acute myeloid leukemia involving isolated trisomy 6.

Keywords: Acute myeloid leukemia, trisomy 6, hyperplastic bone marrow

Introduction

The various biological and prognostic subgroups of myeloid malignancies are characterized by particular chromosomal abnormalities. Isolated trisomy 6 is a rare chromosomal abnormality in hematological malignancies. To the best of our knowledge, only 26 patients with acute myeloid leukemia (AML) and isolated trisomy 6 have been reported within the past three decades [1-17]. We wish to add a new case and to review the literature on this topic.

Case presentation

A 75-year-old male was admitted to our hospital because of dyspnea on effort, which had lasted for a month. A physical examination did not disclose any abnormal findings, apart from anemic conjunctivae and mild splenomegaly. A peripheral blood examination demonstrated a leukocyte count of 103.8 × 10^9/L with a blastoid cell frequency of 89.0%, anemia (hemoglobin, 7.3 g/dL), and thrombocytopenia (platelet count, 80 × 10^9/L). Bone marrow aspiration revealed proliferating monoblasts and promonocytes, which accounted for 62.2% and 28.2% of all nucleated cells, respectively. These cells were positive for peroxydase and non-specific esterase (**Figure 1**). Flow-cytometric analysis showed that the cells that exhibited lower CD-45 positivity, which was compatible with monoblasts, were positive for CD56, CD33, and human leukocyte antigen (HLA)-DR and negative for CD2, CD3, CD4, CD5, CD7, CD8, CD10, CD13, CD14, CD16, CD19, CD20, CD34, and CD41. The other popuration, which demonstrated higher positivity for CD45 and were considered to be promonocytes, were positive for CD13, CD14, CD16, CD33, and HLA-DR and negative for CD2, CD3, CD4, CD5, CD7, CD8, CD10, CD19, CD20, CD34, and CD41. Cytogenetic studies of the bone marrow cells detected isolated trisomy 6 as a stemline abnormality (**Figure 2**). Thus, a diagnosis of acute monocytic leukemia was made. We recommended that the patient should receive induction chemotherapy; however, he opted for outpatient treatment, mainly supportive care, because of economic issues. Although red cell and platelet transfusions as well as antibiotics were administered, he died of disease progression three months after the initial diagnosis of leukemia.

Discussion

Various types of trisomy are known to be associated with hematological malignancies [5]. Of these, trisomy 8 is one of the most well documented anomalies, especially with regard to its clinical impact on patient prognosis. However,

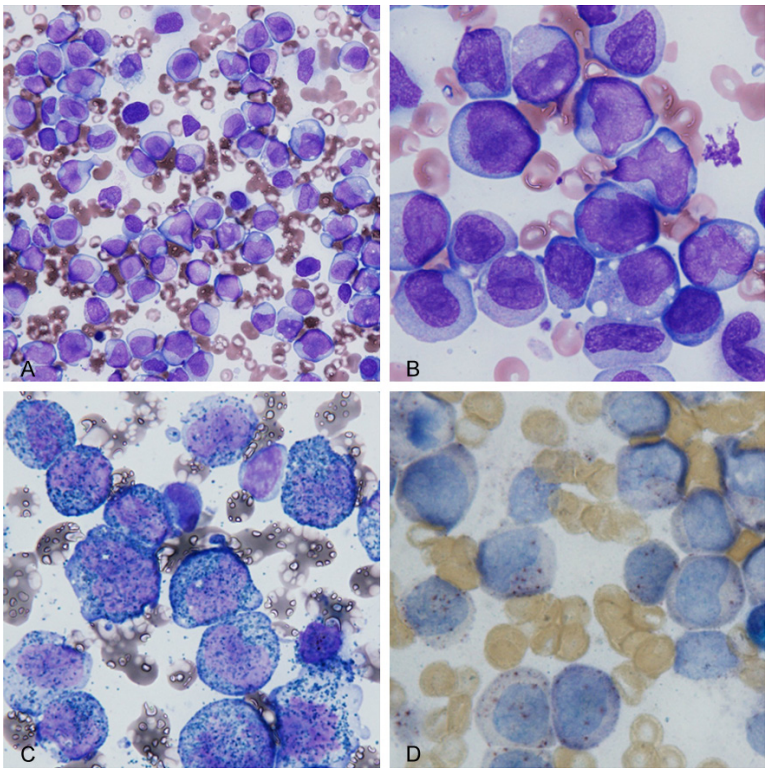

Figure 1. Bone marrow cells with hyperplasia. May-Giemsa-stained blasts are shown (A, × 400; B, × 1000). The blasts were positive for myeloperoxidase staining (C, × 1000) and negative for non-specific esterase staining (D, × 1000).

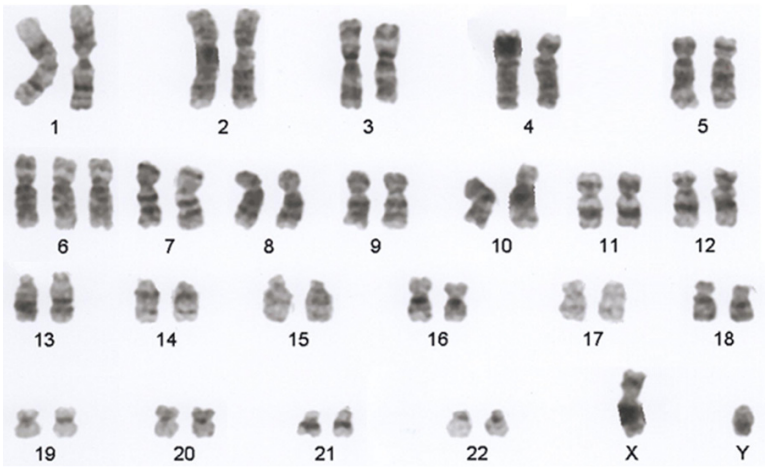

Figure 2. The G-banded karyogram obtained in this case 47,XY,+6.

the occurrence of trisomy 6 as a sole autosomal abnormality is rare in AML. To the best of our knowledge, only 26 cases of AML that harbored trisomy 6 as a sole autosomal abnormality have been reported in the last three decades [1-17]. **Table 1** shows the characteristics of the 27 reported cases (including the present case). The condition displayed a slight female predominance (M:F=11:16), and it was more common among adults, with 4, 9, and 11 cases seen in the ≤20 years, 20-40 years, and >40 years age groups, respectively.

Regarding the characteristics of cases of AML involving isolated trisomy 6, Gupta et al. pointed out that patients with this condition usually exhibited a hypocellular bone marrow and dyserythropoiesis, and they proceeded from aplastic anemia to AML in most of the published cases [16]. On the other hand, a hyperplastic bone marrow was observed in our case, and there have also been several other reports of such hyperplasia [7, 15]. Hence, cases of AML involving trisomy 6 do not always demonstrate a hypoplastic bone marrow. As for the phenotypes seen in AML patients with isolated trisomy 6, among the 21 described cases there were 8 cases of AML-M2, 5 cases of AML-M1, 4 cases of AML-M5 (including our case), 2 cases of AML-M4, and 1 case each of AML-M3 and AML-M7. Hence, there were no obvious characteristics, expect that no cases of AML-M6 have been reported. Concerning surface marker analysis, although few reports have described the findings of such evaluations, it has been claimed that positivity for CD-34 and HLA-DR is a characteristic of the primitive state of blasts [16]. However, in our case while the leukemic monoblasts and promonocytes were negative for CD34 they were positive for HLA-DR. In addition, there was also a case in which the leukemic cells were negative for both of these molecules [7]. Hence, no particular surface antigen features were identified. In conclusion, Yu et al. reported that they could not identify any correlation between morphology or prognosis and the presence of trisomy 6

Table 1. Cases of acute myeloid leukemia involving isolated trisomy 6 reported in the last 3 decades

Case no.	Age/Sex	Diagnosis	WBC ($\times 10^9$/L)	Hb (g/dL)	Plt ($\times 10^9$/L)	G-banded Karyotype	Author
1	24/F	Acute monoblastic leukemia (FAB type M5)	NR	NR	NR	47,XX,+6	Weh HJ (1988)
2	1/F	Acute myeloblastic leukemia with mturation (FAB type M2)	79.6	NR	NR	47,XX,+6/48,idem,+8/49,idem,+3,+8	Petković I (1992)
3	NR/F	Acute myeloblastic leukemia with mturation (FAB type M2)*	NR	NR	NR	47,XX,+6	Berger R (1992)
4	81/M	Acute myeloblastic leukemia with mturation (FAB type M2)	NR	NR	NR	47,XY,+6	Chan LC (1992)
5	55/M	Acute myeloblastic leukemia with mturation (FAB type M2)	NR	NR	NR	47,XY,+6	UKCCG (1992)
6	8/M	Acute promyelocytic leukemia (FAB type M3)	NR	NR	NR	47,XY,+6	UKCCG (1992)
7	32/F	Acute monoblastic leukemia (FAB type M5)	NR	NR	NR	47,XX,+6	UKCCG (1992)
8	63/F	Acute myeloid leukemia, NOS*	4.8	13.5	6	47,XX,+6	Jonveaux P (1994)
9	28/F	Acute myeloblastic leukemia with mturation (FAB type M2)	4	11	53	47,XX,+6	Jonveaux P (1994)
10	37/F	Acute myeloblastic leukemia without mturation (FAB type M1)	5.1	12.2	11	47,XX,+6	Mohamed AN (1998)
11	66/F	Acute myelomonocytic leukemia (FAB type M4)	2.6	8.1	51	47,XX,+6	Mohamed AN (1998)
12	74/M	Acute myeloblastic leukemia without mturation (FAB type M1)	29.4	9.3	26	47,XY,+6	Mohamed AN (1998)
13	22/M	Acute myeloblastic leukemia without mturation (FAB type M1)	4.4	12.5	238	47,XY,+6	Mohamed AN (1998)
14	40/M	Acute myeloblastic leukemia without mturation (FAB type M1)	86.5	11.1	63	47,XY,+6	Mohamed AN (1998)
15	13/F	Acute myeloblastic leukemia with mturation (FAB type M2)	NR	NR	NR	47,XX,t(2;14)(q?24;q?24)c,+6	Huhta T (1999)
16	NR/M	Acute myeloid leukemia, NOS	NR	NR	NR	46,XY,+6,der(14;15)(q10;q10)c	Raimondi SC (1999)
17	41/F	Acute myeloid leukemia, NOS	NR	NR	NR	47,XX,+6	de Souza Fernandez T (2000)
18	NR/F	Acute myeloid leukemia, NOS	NR	NR	NR	47,XX,+6	Kerndrup GB (2001)
19	61/F	Acute myeloid leukemia, NOS	NR	NR	NR	47,XX,+6	Beyer V (2004)
20	22m/M	Acute megakaryoblastic leukemia (FAB type M7)	16.4	7.6	6	47,XY,+6	McCullough SJ (2004)
21	8/F	Acute myeloblastic leukemia with mturation (FAB type M2)	NR	NR	NR	47,XX,+6	Koh KN (2014)
22	51/M	Acute myeloblastic leukemia without mturation (FAB type M1)	20.77	13.5	4	47,XY,+6	Yu S (2014)
23	25/F	Acute myeloblastic leukemia with mturation (FAB type M2)	82.94	8	109	47,XX,+6	Yu S (2014)
24	82/M	Acute myelomonocytic leukemia (FAB type M4)	5.08	6.4	21	47,XY,+6	Yu S (2014)
25	21/F	Acute monoblastic leukemia (FAB type M5)	56.3	5.4	85	47,XX,+6	Gupta M (2015)
26	50/F	Acute myeloid leukemia, NOS†	NR	8.5	11	47,XX,+6	Aydın MS (2017)
27	75/M	Acute monocytic leukemia (FAB type M5)	103.8	7.3	80	47,XY,+6	Present case

FAB, French-American-British classification; NR, not reported; NOS, not otherwise specified. *in relapse. †therapy-related.

as a sole autosomal abnormality in AML [15], and we did not detect any obvious surface marker characteristics among such cases. Further accumulation of cases is necessary to obtain accurate data regarding the bone marrow cellularity, phenotype, and frequency of trisomy 6 within AML.

Disclosure of conflict of interest

None.

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