Annals of Hematology (2019) 98:2005–2007
https://doi.org/10.1007/s00277-019-03660-8

LETTER TO THE EDITOR

Clinicohematologic and cytogenetic profile in a rare case of pure erythroid leukemia

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Received: 27 February 2019 / Accepted: 4 March 2019 / Published online: 11 March 2019

Dear Editor,

Pure erythroid leukemia (PEL) represents a rare and clinically aggressive type of acute leukemia. It accounts for less than 1% of acute myeloid leukemia (AML) [1]. PEL is the only type of acute erythroid leukemia, as per 2016 WHO classification, which is characterized by neoplastic proliferation of immature erythroblasts with > 80% immature erythroid precursors in the bone marrow of which ≥ 30% are proerythroblasts with no significant myeloblast component [2]. PEL often evolves from prior myelodysplastic syndrome (MDS), commonly with morphological dysplasia, but can also develop de novo. We report here a case of PEL with complex karyotype showing multiple cytogenetic abnormalities.

A 65-year-old male, transfusion dependent, presented with pancytopenia. His hemoglobin was 84 g/L; total leucocyte and platelet counts were 1.76×10^9/L and 16×10^9/L, respectively, with 2% blasts in peripheral blood smear. Bone marrow (BM) aspirate smears (Fig. 1a, b) were hypercellular, almost entirely replaced by large cells, early erythroid in morphology, fine chromatin, many showing nucleoli, indentation and a deep blue vacuolated cytoplasm. Many bizarre cells as well as binucleate and multinucleate cells were seen. A few myeloid cells and megakaryocytes showing dysmyelopoiesis and dysmegakaryopoiesis were seen. BM biopsy (Fig. 1c) showed a similar picture with immature erythroid cells being CD71 positive (Fig. 1d). CD34 showed no increase in myeloblasts (Fig. 1e). BM picture was suggestive of AML, PEL. Flowcytometric immunophenotyping showed abnormal cells to be positive for CD71 and glycophorin A, commensurate with morphology seen on BM aspirate and biopsy. Karyotyping (Fig. 1f) revealed complex karyotype, 48~55,XY,+8,i(8)(q10),del(9)(q33),t(9;13)(p23;q31),del(12)(p13),-21,+mar1,+mar2,+mar3,+mar4,+mar5,+mar6[cp17]/46,XY [1]. Cytogenetic analysis of 18 metaphases reveals the presence of a neoplastic clone characterized by a composite karyotype showing hyperdiploidy (modal number 48 to 55) with multiple structural abnormalities in 17 metaphases. Numerical abnormalities were characterized by gain of chromosome 8 and loss of chromosome 21 in 12 metaphases each, along with one to six marker chromosomes (four different types).Structural abnormality was characterized by formation of isochromosome 8 by its long arm (in 7 metaphases), deletion of long arm of chromosome 9 (in 4 metaphases), in addition there is balanced translocation between short arm of chromosome 9 and long arm of chromosome 13 (in 2 metaphases), in 2 other metaphases there is deletion of short arm of chromosome 12. Fluorescence in situ hybridization (FISH) using *KMT2A(=MLL)* break apart probe (Fig. 1h), *TP53* gene DC, and deletion probe (Fig. 1i) were negative; RUNX1/RUNX1T1 probe (Fig. 1g) showed 1 copy of RUNX1 and 4 copies of RUNX1T1 in 4% and 66% of interphase cells respectively; BCR/ABL1 gene probe (Fig. 1j) showed one copy of ABL1 gene in 35% of the cells analyzed indicating terminal deletion of the ABL1 gene. Real-time PCR for *NPM1*, *FLT3-ITD/TKD*, *PML-RARA*, *BCR-ABL*, *AML-ETO*, and inv 16 was negative. He was started on decitabine 20 mg/m2 IV for 5 days. With supportive measures, he was discharged on request and died at home 2 weeks later.

PEL may pose a diagnostic challenge and requires specific clinical, laboratory, morphological, immunophenotypic, and cytogenetic work up for a definite diagnosis. Our case showed a BM picture classically described for PEL with trilineage dyspoiesis [3]. The key morphological features differentiating PEL from entities such as AML with myelodysplasia-related changes with erythroid hyperplasia or MDS with excess blasts with erythroid hyperplasia are as follows: percentage of erythroid cells with presence of erythroid precursors more

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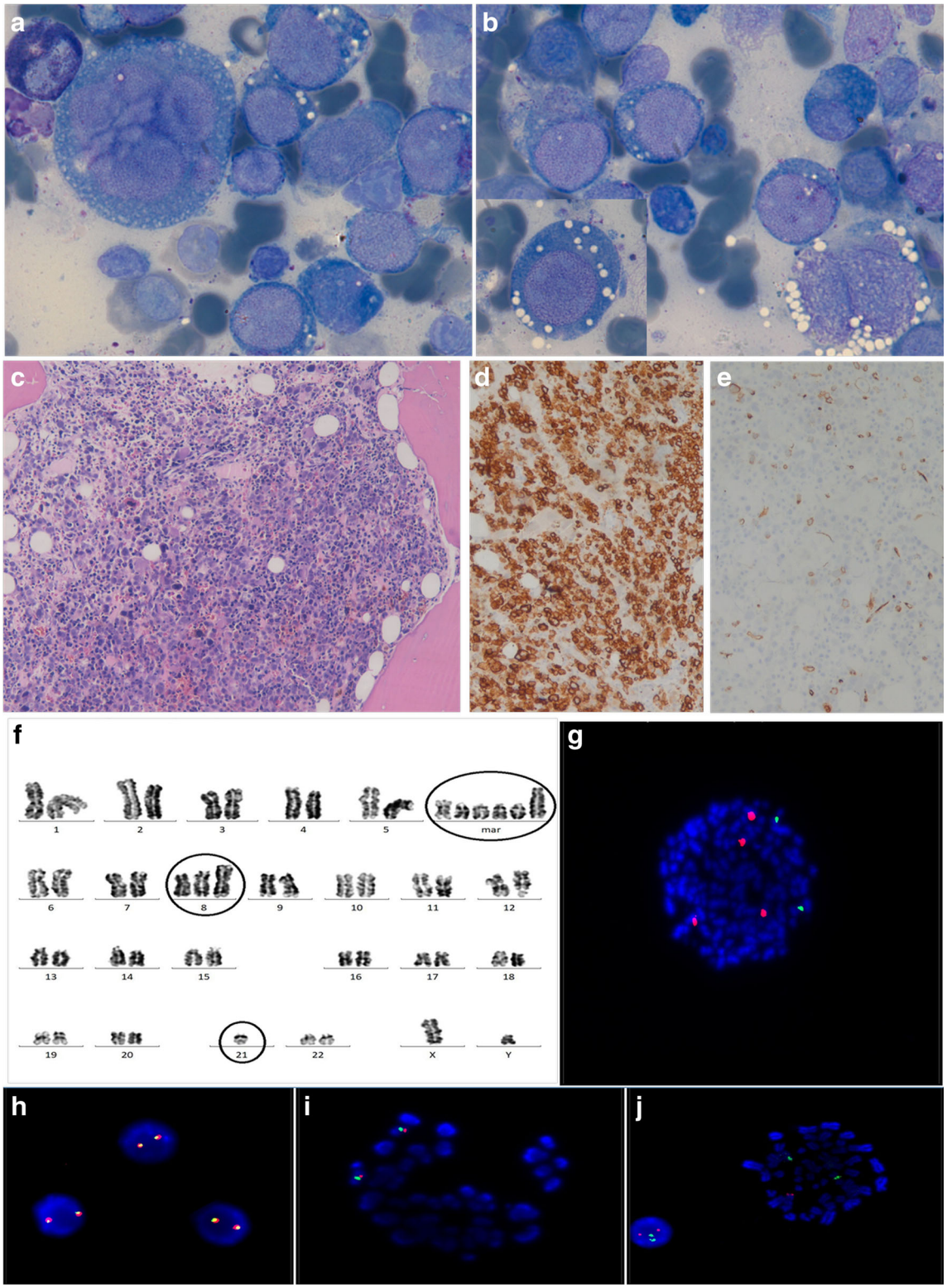

Fig. 1 **a**, **b** BM aspirate smears showing predominantly early erythroid precursors including bizarre multinucleate forms with high N:C ratio, fine chromatin, many showing nucleoli and deep blue vacuolated cytoplasm (Leishman & Giemsa, × 1000). **c** BM biopsy showing trilineage dyspoiesis with sheets of erythroid cells (H&E, × 200) which were positive for CD71 (**d**). **e** CD34 showed no increase in myeloblasts. **f** Karyotyping showing complex karyotype. **g** FISH using *RUNX1/RUNX1T1* probe showed four copies *RUNX1T1* gene. FISH using *KMT2A(=MLL)* break apart probe (**h**), *TP53* gene DC, deletion probe (**i**) were negative. **j** FISH using *BCR/ABL1* gene probe showed one copy of *ABL1* gene

than 80% of which > 30% are proerythroblasts and paucity of myeloid cells with < 5% myeloblasts. In immunophenotype, the blasts are positive for CD71, CD36, and glycophorin A [4]. Genetic aberrations in PEL closely resemble to those seen in MDS rather than de novo AML, as seen in our case. PELs frequently present with complex karyotype, commonly involving chromosomes 5 and 7, t(1;16)(p31;q24), t(11;20)(p11;q11) [1]. Chromosome 17 abnormalities and *TP53* mutations are common in PEL [5]. *FLT3*, *NPM1*, or *CEBPA* mutations are rare. Our patient was, however, negative for *FLT3* and *NPM1*. PEL has a dismal prognosis with a median survival of 3 months [6].

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Taken.

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