A man with concomitant polycythemia vera and chronic myeloid leukemia: the dynamics of the two disorders

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Received: 6 October 2009 / Revised: 30 November 2009 / Accepted: 10 December 2009 / Published online: 5 January 2010
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Abstract The co-occurrence of JAK2 V617F mutation with BCR-ABL reciprocal translocation is uncommon. We report a 60-year-old man who initially presented with phenotype of polycythemia vera (PV), which evolved into chronic myeloid leukemia and back to PV once treatment with imatinib was commenced. JAK2 V617F mutation and BCR-ABL fusion transcripts were detected in the initial sample. However, JAK2 V617F alleles diminished when BCR-ABL mRNA burden increased and reappeared once the patient was commenced on imatinib. The dynamic interaction between JAK2 V617F and BCR-ABL implies that two independent clones exist with the JAK2 V617F clone only achieving clonal dominance when BCR-ABL positive clones are suppressed by imatinib.

Keywords Chronic myeloid leukemia · Polycythemia vera · Bcr-Abl · JAK2 V617F mutation · Stem cell

1 Introduction

The myeloproliferative neoplasms (MPN) are characterised by a disorder of clonal haemopoietic stem cells leading to proliferation of the granulocytic, erythroid or megakaryocytic lineages, either alone or in concert. The BCR-ABL fusion gene occurring as a result of t(9;22)(q34;q11.2) or variant translocations is of particular relevance in its classification as its presence indicates chronic myeloid leukemia (CML). The JAK2 V617F mutation meanwhile is found in almost all patients with polycythemia vera (PV) and a proportion of patients with primary myelofibrosis (PMF) and essential thrombocythemia (ET). Both these genetic aberrations are generally considered mutually exclusive. We report here a patient who was found to harbour both BCR-ABL and JAK2 V617F mutation with dynamic changes in their proportions correlating with the clinical presentation and treatment response, which provides valuable insights into the interactions between the two mutations.

2 Case report

A 60-year-old man with ischaemic heart disease and hypertension was referred for hematology opinion in 2005 by the cardiologist for polycythemia. Closer questioning revealed that the patient had undergone a series of therapeutic venesection between 2000 and 2002. A complete blood count showed that the patient was polycythemic [hemoglobin (Hb) of 185 g/L] with neutrophil leucytosis (12.9 × 10^9/L) and normal platelet counts (392 × 10^9/L). The patient, however, declined a bone marrow examination. A year later, he was seen again at the hematology clinic with pallor and massive splenomegaly. He was anemic with a Hb level of 85 g/L with marked leucytosis (121 × 10^9/L) and normal platelet count (152 × 10^9/L). The peripheral blood film showed a leucoerythroblastic picture with 38% granulocytic precursors, 4% basophils and 2% blasts. The bone marrow appearance was consistent with CML in chronic phase and was positive for the Philadelphia (Ph) chromosome.

He was started on imatinib mesylate 400 mg daily with achievement of complete cytogenetic response (CCR) in 6 months and major molecular response in 24 months.