Platelet Satellitism as Presenting Finding in Mantle Cell Lymphoma

A Case Report

Christine Cesca, MD, Jonathan Ben-Ezra, MD, and Roger S. Riley, MD, PhD

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Abstract

Platelet satellitism surrounding polymorphonuclear neutrophils has been observed almost exclusively in EDTA-treated blood at room temperature. The mechanism underlying this phenomenon is not understood fully. We report a case of platelet rosetting around atypical lymphocytes in peripheral blood smears made from EDTA-treated and untreated blood. Flow cytometry of the peripheral blood sample and immunohistochemical stains of the subsequent bone marrow biopsy specimen revealed a monoclonal B-cell population positive for CD5, CD20, and cyclin D1 and negative for CD3 and CD23; cytogenetic findings revealed a complex karyotype that included t(11;14). These findings were consistent with mantle cell lymphoma. To our knowledge, the finding of platelet satellitism involving mantle cell lymphoma cells in peripheral blood has not been reported previously.

Platelet satellitism is virtually always an in vitro phenomenon involving polymorphonuclear neutrophils in EDTA-treated blood. The precise underlying mechanism of platelet satellitism remains to be fully elucidated.

Mantle cell lymphoma (MCL) is a distinct B-cell non-Hodgkin lymphoma derived from a subset of naïve pregerminal center cells. Peripheral blood involvement is not uncommon at diagnosis, and up to 80% of patients will have neoplastic cells in the bloodstream at some time during the clinical course. Peripheral blood involvement may or may not portend a poor prognosis in MCL. We report a case of MCL manifesting with platelet satellites around neoplastic lymphoid cells in the peripheral blood.

Materials and Methods

Peripheral blood was obtained in EDTA-treated tubes using conventional venipuncture methods, after which an automated CBC count was performed on a Cell-Dyn 4000 analyzer (Abbott Diagnostics, Santa Clara, CA). Wright-stained peripheral blood smears were made in the laboratory from the EDTA-preserved blood at room temperature within 2 hours of collection. Flow cytometry was performed on the EDTA-preserved blood using previously published techniques; all antibodies used for flow cytometry were obtained from Coulter, Hialeah, FL. Untreated peripheral blood was obtained from the patient in Unopette tubes (Becton Dickinson, Franklin Lakes, NJ) by heel stick, and peripheral smears were made at the bedside and later Wright-stained. A posterior iliac crest bone marrow aspirate and biopsy subsequently were performed using previously described methods. Immunoperoxidase stains for CD3 and CD23...
Case Report

The patient was a 68-year-old man with a medical history of chronic obstructive pulmonary disease, chronic bronchitis, and coronary artery disease. He was admitted to the Medical College of Virginia Hospitals of Virginia Commonwealth University for respiratory distress. Findings of the workup were consistent with exacerbation of congestive heart failure, exacerbation of chronic obstructive pulmonary disease, and acute bronchitis. The physical examination failed to reveal the presence of lymphadenopathy or splenomegaly. CBC analysis showed a WBC count of 14,500/µL (14.5 × 10^9/L), hemoglobin of 16.2 g/dL (162 g/L), and a platelet count of 214 × 10^3/µL (214 × 10^9/L).

Review of the patient’s peripheral blood smear (EDTA-treated) revealed 39% of the WBCs to be lymphoid cells. Approximately half of these were large and atypical. These cells had a slightly delicate chromatin pattern and a prominent nucleolus. A prominent feature in the peripheral blood was striking platelet satellitism around these larger cells; the normal peripheral blood lymphocytes lacked this platelet satellitism Image I and Table I. A smear made from blood obtained by heel stick demonstrated the same findings. Flow cytometry of the peripheral blood sample revealed a monoclonal population of B cells that was positive for CD5, CD19, and CD20 and negative for CD3 and CD23 Figure 1.

The bone marrow aspirate revealed a population of variably sized lymphocytes constituting 31% of the cells present. Myelopoiesis and erythropoiesis proceeded to maturation, and megakaryocytes were adequate in number and unremarkable in morphologic features. Both clusters of and single large, atypical lymphoid cells were identified throughout the bone marrow biopsy specimen Image 2. Immunoperoxidase stains revealed these cells to be positive for CD5, CD20, and cyclin D1, and negative for CD3 and CD23 Image 3. Cytogenetic analysis of the bone marrow aspirate and peripheral blood sample revealed a very complex karyotype, of which one of the abnormalities was a balanced t(11;14) translocation.

Approximately 3 weeks later, the patient returned to the hospital in deteriorating health; his WBC count at this time was 99,000/µL (99.0 × 10^9/L). Review of his peripheral blood smear revealed large atypical lymphocytes consistent with blastoid transformation of MCL. The platelet satellitism involving the atypical lymphocytes was still present.

Discussion

Platelet satellitism is almost always an in vitro phenomenon involving polymorphonuclear neutrophils in
EDTA-treated blood.\textsuperscript{1,2} This rosetting of platelets around neutrophils is not observed in heparin- or citrate-preserved blood. The underlying mechanism of platelet satellitism remains to be fully elucidated. Evidence exists supporting EDTA-dependent binding of serum IgG antibodies to both platelet glycoprotein IIb/IIIa complexes and neutrophil FcγRIIIb receptors.\textsuperscript{2} Theoretically, chelation of calcium ions by EDTA exposes epitopes on these structures to allow IgG binding. An alternative, nonimmunologic mechanism proposes that thrombospondin, or another alpha-granule platelet protein, has a role in platelet adherence to neutrophils.\textsuperscript{7} Platelet function tests, both in vivo and in vitro, have demonstrated platelets to be physiologically normal in cases of satellitism.\textsuperscript{8} The main clinical significance of this phenomenon lies in spuriously low automated platelet counts (pseudothrombocytopenia), with the patients suffering little, if any, clinical bleeding. The fact that the platelet satellitism was present on the unpreserved heel-stick peripheral blood smear would argue against an EDTA-mediated mechanism in this patient.

In the present case, the diagnosis of MCL is supported by the morphologic, immunologic, and cytogenetic studies. The presence of large atypical cells with nucleoli, as opposed to small cells with cleaved nuclear contours and clumped chromatin, is more in keeping with a presenting diagnosis of blastoid variant as opposed to “normal” MCL.\textsuperscript{4,9-13} The finding of platelet satellitism around MCL cells in the peripheral blood has not been reported previously in the literature, either in the normal or blastoid variants of MCL.\textsuperscript{4,9-13} Moreover, this phenomenon, which typically is seen in EDTA-treated blood, was observed in this patient’s fresh blood sample. Possible mechanisms include a...
common antibody to platelets and lymphoma cells. Alternatively, nonimmunologic factors released by the lymphoma cells may cause platelet adherence. The use of new techniques, including in situ hybridization for platelet protein receptors in the WBCs around which platelets aggregate, may help to elucidate the mechanism of this phenomenon in the future.

From the Department of Pathology, Medical College of Virginia Hospitals of Virginia Commonwealth University, Richmond.

Address reprint requests to Dr Ben-Ezra: Dept of Pathology, Virginia Commonwealth University, PO Box 980250, Richmond, VA 23298-0250.

References