The Heart Surgery Forum #2008-1030
11 (4), 2008 [Epub August 2008]
doi: 10.1532/HSF98.20081030

Online address: http://cardenjennings.metapress.com

Coronary Artery Bypass Grafting in a Patient with Pseudothrombocytopenia: Case Report

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ABSTRACT

A 53-year-old female patient with coronary arterial disease who had been diagnosed with conventional coronary angiography was scheduled to undergo elective coronary artery bypass grafting surgery. Preoperative routine evaluations of the whole blood count revealed severe thrombocytopenia (6000/mm^3). The patient received a consultation by the internal medicine clinic. With an initial diagnosis of pseudothrombocytopenia, the patient's operation was delayed, and she was referred to a hematology clinic for further diagnosis. The thrombocyte count in heparinized whole blood was in the normal range. A smear of a fresh, nonheparinized blood sample revealed thrombocytes in aggregations of 5 to 14, which confirmed the diagnosis. The patient underwent operation with cardiopulmonary bypass with normal heparinization, and no unexpected postoperative complications, including bleeding, occurred in the early postoperative period. She had an uneventful recovery and was discharged from the hospital on the seventh postoperative day. Later routine polyclinic control evaluations showed no complications. We think the possibility of pseudothrombocytopenia should be discussed with patients. With the correct diagnosis, such patients can be safely given the chance of operation with no more than the usual risks of coronary bypass surgery.

INTRODUCTION

Pseudothrombocytopenia is a thrombocytopenia situation in which the platelet count of a patient is low because of thrombocyte activation during blood sampling, thrombocyte aggregation in the injector or tube where the sample is placed, in vitro agglutination of thrombocytes due to the presence of EDTA, unavailability of an accurate megathrombocyte count, or a decrease in the number of thrombocytes because of the presence of monoclonal antibodies such as abciximab, eptifibatide, or tirofiban, which bind to the thrombocyte glycoprotein receptors [Wilkes 2000; Nair 2007].

Received March 28, 2008; accepted July 1, 2008.

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The reasons for pseudothrombocytopenia due to EDTA are the immunoglobulin M (IgM) and IgG antibodies for cryptic thrombocyte antigens in the presence of only this anticoagulant. Pseudothrombocytopenia due to EDTA can be identified by analyzing a smear of peripheral blood from the patient with different anticoagulants, such as citrate, oxalate, or heparin. The incidence of pseudothrombocytopenia in adults is 0.9% to 2%, and it is rarely found in children. When the condition is found, no further diagnosis or therapy is necessary. On the other hand, failure to make the diagnosis can result in unnecessary diagnostic studies, therapies, and costs [Pegels 1982]. In the present case, we describe a patient who had severe pseudothrombocytopenia and underwent a successful coronary arterial bypass operation with cardiopulmonary bypass.

CASE REPORT

A 53-year-old female patient was admitted to our hospital with a history of chest pain and dyspnea that had been aggravated with effort over the previous 2 years. The patient underwent a conventional coronary angiography examination and received a diagnosis of coronary arterial disease. During the routine preoperative evaluations prior to surgery, the patient's serum appeared to have normal values for biochemical parameters. A whole blood count, however, revealed a thrombocyte count of 6000/mm^3, although the values for the other parameters were normal. The low platelet counts persisted in additional whole blood counts.

The patient received consultation from the internal medicine clinic. Examination of a heparinized sample of whole blood revealed a thrombocyte count in the normal range. It was then decided that the patient should consult with a hematology clinic regarding the initial diagnosis of pseudothrombocytopenia for a differential diagnosis. The planned coronary bypass operation was delayed, and the patient was discharged to a hematology clinic.

Peripheral Smear

The peripheral smear of a nonheparinized sample of fresh whole blood showed thrombocytes forming aggregations of 5 to 14, confirming the diagnosis. The coronary bypass operation was the scheduled for the patient. The patient returned to our hospital for the operation.

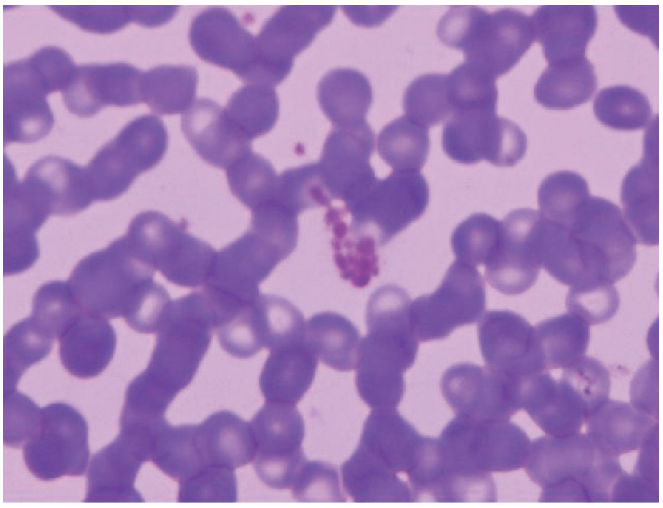
Operative Technique

The operation was performed with the patient under cardiac arrest provided by routine aortocaval cannulation after intravenous administration of a normal full heparin dose (0.2 mg/kg), systemic hypothermia at 28°C, and antegrade cold blood cardioplegia. Distal and proximal anastomoses were performed during cardiac arrest, and cardiopulmonary bypass was terminated. Protamine was administered at the usual protamine-heparin ratio of 1.3:1, and the patient was decannulated with no problems.

No unexpected bleeding complications occurred in the operating theater or the intensive care unit. The patient left the intensive care unit on the first postoperative day. The drains were removed on the third postoperative day with a total drainage of 600 mL. The patient was discharged from the hospital on the seventh postoperative day with oral anticoagulant therapy. Routine polyclinic control tests showed no problems, but the low platelet count persisted in samples of whole blood without any bleeding complications.

Histopathologic Examination

A direct microscopical examination of a smear of the patient's whole peripheral blood without heparinization showed aggregations of 5 to 14 platelets (Figure), which were found toward the edge of the smear.



Preoperative image of a heparinized smear of the patient's whole blood, showing clumping of thrombocytes in aggregates of greater than 12 (brilliant cresyl blue, original magnification ×100).

DISCUSSION

The finding of severe thrombocytopenia after cardiac surgery generally triggers a platelet transfusion. In the absence of any bleeding tendency, the possibility of pseudothrombocytopenia should be considered. EDTA-associated pseudothrombocytopenia can easily be diagnosed by repeating the platelet count with citrate- or heparin-anticoagulated blood samples. Examination of a peripheral blood smear along with the automated complete blood counts will be helpful in arriving at the diagnosis. This step could potentially avoid mismanagement in the form of unnecessary platelet transfusions [Nair 2007].

EDTA-dependent pseudothrombocytopenia usually tends to appear in hospitalized patients after an initially normal platelet count. In our case, however, the occurrence of a low platelet count was revealed before the operation, suggesting a tendency for the patient to bleed. As antibody levels decrease, this phenomenon becomes less prominent by the third or fourth week [Pegels 1982; Wilkes 2000]. The patient in our case showed no increase in platelet counts in the whole blood count, even 6 weeks after surgery. Information is lacking in the literature regarding recurrent observations of this phenomenon in patients over time. The combination of an appropriate history, a clinical examination that excludes the possibility of hemorrhages, and a normal platelet count and function in citrate- or heparin-anticoagulated blood all help in diagnosing the condition.

Confirmatory tests include IgG assays for antibodies to the glycoprotein IIb-IIIa complex on the platelet surface. These studies were unnecessary in our case because the final diagnosis was obtained before such tests became necessary. Antiplatelet medications should be continued in cases of pseudothrombocytopenia to prevent thrombotic complications, because in vivo platelet counts and function are normal [Pegels 1982; Bartels 1997; Lau 2004]. In our case, oral warfarin therapy continued as long as the patient was being treated through our cardiovascular surgery department.

In patients presenting for surgery, a clinical perspective is recommended if the absence of a clinical history coincides with large variation in platelet counts [Bizzaro 1995]. In our case, no history of bleeding suggesting a coagulation disorder was present before the operation. Platelet clumping on the blood film indicates the presence of pseudothrombocytopenia, but automated cell counters may not provide this information. In patients with pseudothrombocytopenia, the platelet count obtained from blood in sampling bottles containing EDTA may not accurately reflect the in vivo status. In some but not all patients, in vitro platelet clumping may be prevented by using citrated containers. Blood samples should be analyzed before prolonged exposure to room temperatures. If this precaution is not practical, other tests, such as thromboelastography, may be used to evaluate the numerical and functional integrity of circulating platelets.

We think that the possibility of pseudothrombocytopenia should be discussed with patients. Actual thrombocytopenia is an important morbidity factor for patients undergoing a coronary artery bypass grafting operation, but with a correct diagnosis, patients with pseudothrombocytopenia can be safely given the chance of an operation and undergo their operation with no more than the usual risks of coronary bypass surgery.

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