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Medicine

Pseudo-thrombocytopenia: A Comprehensive Overview with a Case Study of a 21-Year-Old Female with Non-Alcoholic Liver Disease

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Abstract	Case Report

Introduction: Pseudo-thrombocytopenia is a rare but significant laboratory phenomenon characterized by falsely low platelet counts due to in vitro platelet clumping. It poses challenges in clinical management as it can lead to unnecessary diagnostic evaluations and potentially inappropriate treatments. This condition is often identified during routine blood testing when automated analysers misinterpret clumped platelets as individual cells. Differential diagnosis from true thrombocytopenia is essential to prevent unnecessary interventions and ensure appropriate patient care. Management involves proper sample handling techniques and confirmatory testing using alternative anticoagulants like citrate. This abstract explores the pathophysiology, diagnostic challenges, and management strategies of pseudo-thrombocytopenia to guide clinical practitioners in its identification and differentiation from true thrombocytopenia. ***Case report:*** A 21-year-old female with a background history of non-alcoholic liver disease was found to have an exceptionally low platelet count of 8×10^9/L but had no signs of bleeding. Liver function tests and the rest of her CBC were normal. A blood film was requested showing platelet clumping, suggestive of pseudo-thrombocytopenia. Further unnecessary hematological investigations were therefore avoided. ***Conclusion:*** Pseudo-thrombocytopenia is a laboratory artifact that can be mistaken for true thrombocytopenia. Understanding its etiology, mechanism, and diagnostic approaches is essential for healthcare providers. Correct identification of this condition ensures accurate patient care and prevents unnecessary treatments.
Keywords: Pseudo-thrombocytopenia, Platelet Clumping, Citrated sample.

1. INTRODUCTION

Pseudo-thrombocytopenia is a laboratory artifact characterized by a falsely low platelet count due to in-lab platelet clumping. Unlike true thrombocytopenia, which signifies a genuine decrease in platelet numbers, pseudo-thrombocytopenia arises from technical issues during blood sample processing. It is often identified incidentally during routine blood tests [1].

Pseudo-thrombocytopenia is rare, occurring in approximately 0.1% to 0.2% of all routine CBCs. It can affect individuals of any age and sex and is usually asymptomatic, although it may lead to unnecessary further investigations and interventions if not recognized promptly [2].

2. Etiology

The primary cause of pseudo-thrombocytopenia is the presence of platelet-reactive antibodies, which induce platelet clumping when blood is collected in certain anticoagulants, such as ethylenediaminetetraacetic acid (EDTA). Additional factors contributing to pseudo-thrombocytopenia include cold agglutinins, which can cause platelet clumping at lower temperatures, and improper sample handling or delayed processing [3].

3. Diagnosis
Clinical Presentation:

Patients with pseudo-thrombocytopenia typically lack symptoms associated with low platelet counts, such as excessive bleeding, easy bruising, or petechiae.

Laboratory Tests and Findings:
- ✓ **Complete Blood Count (CBC):** An initial CBC may show a low platelet count, prompting further investigation.

- ✓ **Peripheral Blood Smear:** Microscopic examination reveals platelet clumping, suggesting pseudo-thrombocytopenia.
- ✓ **Alternative Anticoagulants:** Repeating the CBC using citrate or heparin instead of EDTA can prevent platelet clumping, confirming the diagnosis.
- ✓ **Manual Platelet Count:** Direct microscopic counting can bypass issues seen in automated analysers [3].

Differential Diagnosis:
It is crucial to differentiate pseudo-thrombocytopenia from true thrombocytopenia to avoid unnecessary treatments. Conditions to consider include immune thrombocytopenia (ITP), bone marrow disorders such as aplastic anemia or leukemia, and consumptive coagulopathies including disseminated intravascular coagulation (DIC).

4. Mechanism
The mechanism underlying pseudo-thrombocytopenia involves the interaction between platelet-reactive antibodies and EDTA, an anticoagulant used in blood collection tubes. EDTA induces a conformational change in platelet surface glycoproteins, exposing epitopes that bind to antibodies and cause platelet agglutination. This aggregation results in an apparent reduction in platelet count when measured by automated analysers [3].

5. Management and Treatment
Correcting the Diagnosis:
To confirm pseudo-thrombocytopenia, reevaluate the blood sample using different anticoagulants or by manual counting methods:

- ✓ **Repeat Testing with Citrate or Heparin:** These anticoagulants do not induce the same antibody reaction as EDTA, preventing platelet clumping.
- ✓ **Manual Platelet Count:** Microscopic evaluation can accurately count platelets and identify clumps.

Avoiding Misdiagnosis:
Proper identification of pseudo-thrombocytopenia prevents misdiagnosis and avoids unnecessary treatments such as platelet transfusions, steroids, or other interventions for true thrombocytopenia.

6. Clinical Significance
Pseudo-thrombocytopenia can significantly impact patient care. Misdiagnosis can lead to unwarranted concern, inappropriate treatments, and additional diagnostic procedures. Awareness and correct diagnosis are crucial for effective patient management and avoiding unnecessary interventions.

Case Study: 21-Year-Old Female with Non-Alcoholic Liver Disease
A 21-year-old female with a background history of non-alcoholic liver disease but no fibrosis presented to the walk-in clinic with general malaise and associated lower abdominal pain. She had a faintly positive home pregnancy test. Two days prior, she presented to the ER with similar symptoms and was found to have an exceptionally low platelet count of $8 \times 10^9/L$, with a negative pregnancy test. She was discharged with outpatient hematology follow-up and advised to return if she developed any bleeding or bruising.

On her second presentation, she showed no signs of bleeding. Her repeated blood work again showed a low platelet count of $9 \times 10^9/L$. Liver function test and the rest of her CBC and her liver function were normal, and the pregnancy test remained negative. A citrated sample was used to recheck the CBC. This showed low platelet counts of $9 \times 10^9/L$. The blood film report showed platelet clumping, suggesting pseudo-thrombocytopenia. Hematology consultation advised that citrated results are not accurate if platelet clumping is present. They recommended that the patient be reassured, and unnecessary investigations be avoided. Given the patient's lack of symptoms and bleeding history, she was safely discharged home.

This case highlights the importance of recognizing pseudo-thrombocytopenia to prevent unnecessary treatments and diagnostic procedures. The presence of platelet clumping on a blood smear, especially in the absence of clinical symptoms of thrombocytopenia, should prompt consideration of pseudo-thrombocytopenia.

7. CONCLUSION
Pseudo-thrombocytopenia is a laboratory artifact that can be mistaken for true thrombocytopenia. Understanding its etiology, mechanism, and diagnostic approaches is essential for healthcare providers. Correct identification of this condition ensures accurate patient care and prevents unnecessary treatments.

Practical Tips for Clinicians:
- ✓ **Communicating with Patients:** When informing patients about pseudo-thrombocytopenia, emphasize that it is a laboratory artifact and does not indicate a true health problem.
- ✓ **Interdisciplinary Collaboration:** Work closely with laboratory staff to ensure proper sample handling and accurate reporting of blood test results.
- ✓ **Case Documentation:** Thoroughly document cases of pseudo-thrombocytopenia to contribute to the medical literature and improve awareness among healthcare providers.

By remaining vigilant and informed, medical professionals can accurately diagnose pseudo-thrombocytopenia, ensuring appropriate and effective patient care.

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