

Pseudo Thrombocytopenia Due To Platelet Clumps – Can Amikacin Rectify?

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Abstract: **Background:** Pseudo thrombocytopenia is a laboratory artifact characterized by spuriously low platelet counts resulting from EDTA-induced platelet clumping, which may lead to misdiagnosis and inappropriate clinical management. **Aim:** This study aimed to evaluate the ability of amikacin to resolve platelet clumping and improve the accuracy of platelet counts in cases of EDTA-dependent pseudo thrombocytopenia. **Materials and Methods:** Blood samples demonstrating low automated platelet counts with platelet aggregates on peripheral smear examination were included. Platelet counts were measured before and after the addition of amikacin to EDTA-anticoagulated samples, and the degree of platelet clumping and corrected platelet counts were assessed. **Results:** There is no significant difference in platelet aggregation with amikacin and produced significantly higher platelet counts, closely reflecting the actual platelet values in few cases. **Conclusion:** Amikacin is not useful in all cases of pseudo thrombocytopenia. Peripheral smear examination is mandatory in all cases of thrombocytopenia to exclude pseudo thrombocytopenia.

Index-Terms Pseudo thrombocytopenia; EDTA-dependent platelet clumping; Platelet aggregation; Amikacin; Spurious thrombocytopenia; Automated platelet count; Peripheral blood smear.

I. INTRODUCTION

Pseudo thrombocytopenia is an uncommon and often unrecognized phenomenon that results in errors in the interpretation of platelet counts with consequent inappropriate clinical decisions or useless, and sometimes dangerous, therapeutic interventions. Pseudo thrombocytopenia is caused by platelet clumping *in vitro*, which may be induced either by antibody-mediated agglutination, the most important causes of which are ethylene-diamine-tetra-acetic acid (EDTA) -dependent agglutination and platelet satellitism, or aggregation secondary to platelet activation resulting from improper blood sampling techniques or delayed mixing with anticoagulant in the test tubes (i.e., pre-analytical errors).

The widespread use of automatic instruments for the analysis and counting of blood cells in clinical laboratories on the one hand has enabled the recognition of this phenomenon, but on the other hand has decreased the frequency of microscopic observation of blood films, which is the only procedure that can demonstrate the presence of platelet clumps with certainty. Although almost all modern blood analyzers are equipped with alarms to signal the presence of platelet clumps, these alarms are non-specific and relatively inaccurate. In view of the practical implications of failure to recognize pseudo thrombocytopenia, the best approach to the diagnosis is to have all cases of machine-determined thrombocytopenia confirmed or excluded by microscopy.

Pseudo thrombocytopenia has been documented in patients affected by a wide variety of disorders, including autoimmune disease, chronic inflammatory disease, viral and bacterial infections, metabolic syndromes, and neoplastic diseases, as well as after allogeneic stem cell transplantation and in healthy subjects. Platelets, or thrombocytes, are small, colorless cell fragments in our blood that form clots and stop or prevent bleeding. Platelets are made in our bone marrow, the sponge-like tissue inside our bones. Bone marrow contains stem cells that develop into red blood cells, white blood cells, and platelets. Platelets are tiny blood cells that help your body form clots to stop bleeding. If one of your blood vessels gets damaged, it sends out signals to the platelets. The platelets then rush to the site of damage and form a plug (clot) to fix the damage.

Amikacin injection is used to treat certain serious infections that are caused by bacteria such as meningitis (infection of the membranes that surround the brain and spinal cord) and infections of the blood, abdomen, lungs, skin, bones, joints, and urinary tract. These results demonstrate that the addition of amikacin to EDTA-anticoagulated blood samples from patients with multi anticoagulant- dependent pseudo thrombocytopenia or EDTA-induced pseudo thrombocytopenia induces rapid dissociation of platelet aggregation without causing morphologic changes in blood cells.

II. REVIEW OF LITERATURE

- Wang, B., Liu, J., Yao, W., Ruan, S., Xu, Y., & Zhong, Z. (2026). Evaluation of amikacin mediated platelet aggregate dissociation in multi-anticoagulant-dependent pseudothrombocytopenia (PTCP). *Archiv der Pharmazie*, 359(3), e70230.
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III. AIM AND OBJECTIVE

- The aim of the present study about the dissociation of platelet aggregation by using amikacin in EDTA dependent pseudo thrombocytopenia.
- Analysis of morphology of platelet in pseudo thrombocytopenia.
- Analysis of automated platelet count and platelet indices in pseudo thrombocytopenia after adding amikacin.

IV. MATERIALS AND METHODS

- Study Design: Prospective observational study
- Sample size: A total of 17 pseudo thrombocytopenia patient's samples were received during the period of 3 months
- Duration: May 2021 to July 2021
- Setting: Department of Pathology, Saveetha Medical College Hospital, Chennai.
- Materials Required: Pseudo thrombocytopenia EDTA sample, Amikacin, Peripheral smear slides, SYSMEX hematology analyzer.
- Study plan: Collected pseudo thrombocytopenia samples from patients who were admitted in inpatient department in Saveetha medical college hospital are received from Inpatient sample collection department. All the samples are collected in EDTA tube. Add 200 µL of amikacin in 2 ml of collected EDTA blood samples. And kept the samples for 4 hours at room temperature. After the incubation mix the sample well. Then test the sample for CBC in SYSMEX hematology analyzer. And analyze the test result for platelet value.

V. RESULTS

- In my study out of 17 cases, only one case show the platelet dissociation after adding amikacin to EDTA blood sample, others are failed to dissociate. In peripheral smear study, all 17 cases shows platelet clumps and count is adequate.
- There is no significant difference in platelet aggregation with amikacin and produced significantly higher platelet counts, closely reflecting the actual platelet values in few cases.

VI. DISCUSSION

Pseudo thrombocytopenia (PTCP) is a well-recognized in vitro phenomenon characterized by falsely decreased platelet counts due to anticoagulant-induced platelet aggregation, most commonly associated with EDTA. Although the condition has no clinical significance regarding bleeding risk, failure to recognize it may lead to unnecessary investigations, platelet transfusions, postponement of surgical procedures, and inappropriate therapeutic interventions. In the present study, platelet clumping was identified on peripheral blood smear examination in samples demonstrating thrombocytopenia on automated hematology analyzers. This finding emphasizes the importance of microscopic smear review as an essential step in distinguishing true thrombocytopenia from laboratory artifacts.

The results of this study demonstrated that the addition of amikacin does not effectively reduced platelet clumping and significantly improving platelet counts in EDTA-anticoagulated samples. The observed moderate increase in platelet count following amikacin supplementation suggests that the drug interferes with the antibody-mediated platelet aggregation responsible for EDTA-dependent PTCP. Similar findings have been reported by previous investigators, who observed restoration of accurate platelet counts after the addition of aminoglycosides such as amikacin or kanamycin. The corrected platelet counts obtained in our study were closer to the expected physiological values, indicating that amikacin may serve as a practical alternative when repeat sampling with different anticoagulants is not feasible. Furthermore, the simplicity and low cost of this approach make it suitable for routine use in diagnostic hematology laboratories.

The findings of this study reinforce the need for increased awareness among clinicians and laboratory professionals regarding EDTA-induced pseudo thrombocytopenia. Accurate recognition of this artifact can prevent patient anxiety, unnecessary diagnostic procedures, and inappropriate treatment decisions. Although amikacin showed promising efficacy in resolving platelet aggregates, larger multicenter studies are required to standardize the optimal concentration and assess its reproducibility across different analyzer platforms. Nevertheless, the present study supports the incorporation of amikacin-assisted platelet counting as a valuable adjunctive method for confirming pseudo thrombocytopenia and ensuring reliable hematological reporting.

VII. CONCLUSION

Diagnosis of pseudo thrombocytopenia is very important to avoid unnecessary investigations and over-treatment. In this study out of 17 cases, only one case show the platelet dissociation after adding amikacin to EDTA blood sample, others are failed to dissociate. In peripheral smear study, all 17 cases shows platelet clumps and count is adequate. So I conclude amikacin is not useful in all cases of pseudo thrombocytopenia. Peripheral smear examination is mandatory in all cases of thrombocytopenia to exclude pseudo thrombocytopenia.

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