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(CASE REPORT)

# Piperacillin-tazobactam induced thrombocytopenia: A case report

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## Abstract

Piperacillin-tazobactam is a commonly used antibiotic that belongs to penicillin and beta-lactam inhibitors, which has a wide range of gram-negative bacteria and limited gram-positive activity. This case report presents one of the rare ADR of piperacillin–tazobactam –thrombocytopenia where a dramatic improvement within 24hrs in platelet count was observed after withdrawing the drug. Few cases of piperacillin tazobactam-induced thrombocytopenia have been reported.

**Keywords:** Piperacillin-tazobactam; Thrombocytopenia; Multi-drug-resistant; Adverse Drug Reaction

## 1. Introduction

Piperacillin- tazobactam is a broad-spectrum, intravenously administered antibiotic which is a combination of penicillin antibiotics and beta-lactam inhibitors antibiotics. It was approved for medical use in 1993. They have high susceptibility to gram-negative and gram-positive anaerobic organisms. It is used for the treatment of urinary tract infections, gynecological and skin/soft tissue infections intra-abdominal infections, respiratory tract infections ([1]). It is also used for empirical therapy in febrile neutropenia, as first-line therapy for the treatment of bloodstream in neutropenic cancer patients caused by gram–negative rods ([2]). The most common adverse effects are gastrointestinal (nausea, rashes, diarrhea, constipation) effects, renal effect, hematological effects and hypersensitivity reactions. Coomb's positive hemolytic anemia had been reported ([3]). Piperacillin inhibits cell wall synthesis and tazobactam inactivates beta-lactamase and prevents enzymatic degradation of piperacillin. Thrombocytopenia is a rare adverse reaction of piperacillin-tazobactam. It is a life-threatening health condition. Thrombocytopenia is a condition having a low platelet count which means less than 150 x $10^9$/L and severe thrombocytopenia is less than 50,000 cells/microL ([4]). These antibiotics create a drug macromolecule-linked hapten antibodies that induce the humoral immune system, resulting in drug-induced thrombocytopenia ([5]).

## 2. Case report

A 77-year-old female patient presented to the emergency department of our hospital on 10/03/23 with complaints of fever and generalized tiredness for 2 days associated with a productive cough. Her blood investigations were done which showed elevated values (TLC- 13000/µL, CRP- 223.6 mg/dL) indicating infection. Hence her blood and urine culture were sent on 10/03/23 and started with Inj. Piperacillin – tazobactam 2.25 g Q6H as an empirical antibiotic to cover suspected sepsis and T. Tamiflu 60mg BD was also started. Her platelet count was normal before the antibiotic was initiated. A progressive drop in platelet count was observed in the following days after the antibiotics were started and daily platelet count was monitored (Refer Table 1). Her blood culture showed no growth but her urine culture showed growth of *Klebsiella oxytoca*, which was a gram negative multi-drug-resistant organism. Thus, Piperacillin-

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tazobactam was stopped and Fosfomycin sachet was started. On discontinuation of the drug, the platelet count of the patient was found to increase abruptly.

**Table 1** Daily Platelet Count Monitoring

| Parameters | 10/03/23 | 11/03/23 | 12/03/23 | 14/03/23 | 15/04/23 | 16/03/23 | 17/03/23 | 18/03/23 |
|---|---|---|---|---|---|---|---|---|
| Platelets count | 1.61 | 1.22 | 0.58 | 0.44 | 0.30 | 0.60 | 0.84 | 1.75 |

## 3. Discussion

Thrombocytopenia can occur due to decreased production, increased destruction, and dilution of platelets ([6]). Mechanism of thrombocytopenia due to piperacillin is by the drug molecules covalently binding to platelet membrane protein in which this complex produces antibodies and hence results in platelet loss. Another perspective suggests that receiving these antibodies from a donor through blood transfusion can also induce platelet destruction ([7]). During evaluation of thrombocytopenia, bone marrow suppression and immune thrombocytopenia should be thought. DITP usually occurs within 1 or 2 weeks after initiation of medication or within days, if ever there was a previous history of thrombocytopenia due to the same drug. Treatment for DITP is to cease the offending drug, then an increasing trend in the count can be seen within a few days. Other treatment plans include platelet transfusion, intravenous immunoglobulin or steroids.

In this case, our patient was initiated on piperacillin-tazobactam as an empirical treatment due to elevated counts. However in our case,3 days of piperacillin therapy had caused significant thrombocytopenia and after discontinuation, there was an abrupt rise in platelet count. Hence, thrombocytopenia due to piperacillin-tazobactam was seen to be evident in this case. Piperacillin tazobactam-induced thrombocytopenia was also found in patient when the drug was given for 4 days ([7]).

### *Abbreviation*

- ADR: Adverse Drug Reaction
- MDR: Multiple-Drug Resistant
- Q6H: Quarterly 6 hours
- BD: Twice a day
- DITP: Drug-induced thrombocytopenia

## 4. Conclusion

Antibiotics are the most commonly used medications in hospitals. Hematological changes during treatment with antibiotics may result in failure of treatment or even become life-threatening. In this case report, an event of thrombocytopenia caused by Piperacillin-tazobactam is specified which reverted back to normal count within 24 hours.DITP reporting reduces morbidity and mortality and declines superfluous healthcare costs.

## Compliance with ethical standards

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### *Disclosure of conflict of interest*

There are no conflicts of interest.

*Statement of ethical approval*

The present research work does not contain any studies performed on animals/humans subjects by any of the authors.

*Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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