

Case report of vancomycin-induced pancytopenia

**Sorab Gupta^[1], Shorabh Sharma^[1], Nandini Menon^[1],
Shradha Ahuja^[1] and Michelle Dahdouh^[1]**

[1]. Department of Medicine, Internal Medicine, Saint Barnabas Hospital, Bronx, New York, United States of America.

ABSTRACT

Vancomycin is the first-line agent for the treatment of bacteremia, endocarditis, pneumonia, cellulitis, and osteomyelitis. Pancytopenia is an uncommon adverse effect of vancomycin therapy, with only a few cases of vancomycin-related neutropenia and pancytopenia described in the literature. We describe a case of a 56-year-old man who was diagnosed with chronic paraspinal abscess and started on intravenous vancomycin. He was re-admitted two weeks later with new-onset pancytopenia. Discontinuation of vancomycin resulted in improved cell counts. Physicians should monitor cell counts in patients who are on long-term intravenous vancomycin.

Keywords: Vancomycin. Pancytopenia. Rare side effect.

INTRODUCTION

Vancomycin is a tri-cyclic glycopeptide antibiotic that inhibits cell wall synthesis by inhibiting the incorporation of N-acetylmuramic acid and N-acetylglucosamine into the peptidoglycan matrix of the bacterial cell wall and thus affects bacterial replication. Vancomycin is the first-line agent for methicillin-resistant coagulase-negative or coagulase-positive staphylococcal infections, bacteremia, endocarditis, pneumonia, cellulitis, and osteomyelitis.

Vancomycin is associated with adverse effects such as phlebitis, nephrotoxicity, ototoxicity, thrombocytopenia, fixed drug eruption, fever, and *red man syndrome*, which is characterized by flushing of the upper body and pruritus due to histamine release⁽¹⁾. Other adverse reactions include chest pain, hypotension, and muscle spasm. Severe skin manifestations such as Steven-Johnson syndrome, toxic-epidermal necrolysis, and leukocytoclastic vasculitis have also been associated with vancomycin use.

Although isolated cases of vancomycin-associated neutropenia, agranulocytosis, and thrombocytopenia have been reported in the medical literature^{(2) (3)}, there are very few reported cases of pancytopenia. To our knowledge, only four cases of pancytopenia attributed to vancomycin toxicity have been documented^{(4) (5) (6)}.

We report a case of reversible pancytopenia that occurred after the administration of intravenous vancomycin.

CASE REPORT

A 56-year-old Puerto Rican man presented to the emergency room with sudden worsening of chronic midback pain. He had a history of prior intravenous drug abuse and had been complaining of back pain of 3 months duration. Contrast computed tomography (CT) of the lumbar spine revealed a right paraspinal soft tissue mass at the T8-T9 level. Cultures of the purulent secretions were positive for methicillin-resistant *Staphylococcus aureus*. Intravenous vancomycin was initiated, with a recommended course of 8 weeks. A peripherally inserted central catheter (PICC) line was placed, and he was subsequently discharged from the hospital. He returned two weeks later complaining of fever, chills, headache, and malaise lasting for 3 days. He had a fever of 102.3°F when triaged in the emergency room. A complete blood count revealed a white blood cell count of 3.4/ μ L, hemoglobin of 8.4g/dL, and a platelet count of 99,000/ μ L. Two weeks prior to this presentation, his white blood cell count was 5/ μ L, hemoglobin was 9g/dL, and platelet count was 190,000/ μ L.

He was admitted for systemic inflammatory response syndrome, and a repeat CT was performed, which showed a stable radiographic appearance of osteomyelitis/discitis and paraspinal soft tissue swelling at T8-T9. Because no other etiology for new-onset fever and pancytopenia could be found, vancomycin was discontinued, and he was started on piperacillin/tazobactam and daptomycin to treat possible bacteremia.

The PICC line that was placed at the prior admission was removed, and cultures of the tip were negative. In addition, two sets of blood cultures were negative; therefore, the piperacillin/tazobactam antibiotic therapy was discontinued. Within one week of discontinuation of vancomycin, his cell counts improved, with a repeat white blood cell count of 5/ μ L, hemoglobin of 8.3g/dL, and platelet count of 264/ μ L (**Table 1**). A new PICC line was placed, and he completed 6 additional weeks of treatment with daptomycin, with improved symptoms.

Corresponding author : Dr. Sorab Gupta.

e-mail: drsorabgupta@gmail.com

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TABLE 1 - Complete blood count for a male patient who presented to the emergency room with sudden worsening of chronic midback pain, with improvements after vancomycin discontinuation.

	Day 1	Day 10	Day 12	Day 14	Day 18	Day 21
Hemoglobin (g/dL)	9.0	8.4	7.7	8.1	8.3	8.7
Hematocrit	26.9	24.4	22.4	23.9	24.8	25.8
White blood cells (/ μ L)	5.0	3.4	2.6	3.3	4.0	4.6
Platelets (/ μ L)	191	99	120	213	264	227

DISCUSSION

Pancytopenia is a less frequently observed adverse reaction of vancomycin use. The possible mechanisms include marrow suppression, sequestration, and peripheral destruction. Some authors argue against bone marrow suppression owing to bone marrow biopsy findings, which have shown both hypoplasia and hyperplasia of the granulocyte series⁽⁵⁾. However, evidence that supports an immunological etiology also exists. The detection of vancomycin-dependent platelet reactive antibodies by Drygalsi et al⁽¹⁾ and anti-neutrophil antibodies by Schwartz⁽⁷⁾ suggest an immunological basis of the cytopenia. Earlier reports have suggested a link between a rapid infusion rate and the development of pancytopenia⁽⁴⁾. However, pancytopenia also occurs even with slow drug infusion. The severity of the adverse reaction upon drug re- challenge results in response escalation, leading to hectic fever and neutropenia⁽⁸⁾.

The Naranjo adverse reaction probability score for our patient was 6, suggesting that the drug might have caused the side effect. A negative blood culture and the temporal relationship between his presentation and the initiation of vancomycin treatment strongly indicate the latter as the inciting agent. Furthermore, no evidence of clinical signs of sequestration (e.g., portal hypertension and splenomegaly) or peripheral destruction such as icterus or micro-angiopathy was noted.

Pancytopenia is a rare, yet serious, complication of vancomycin therapy. Although reversible, this potential side effect can worsen a patient's clinical course with complications such as bleeding diathesis and immune suppression. Physicians must be mindful of these rare yet potentially severe side effects and monitor the blood counts in such patients, especially those who are on long term intravenous antibiotics or with a history of prior adverse effects with vancomycin use. Vancomycin should be discontinued at the first sign of any hematological

abnormality. It would be prudent to not re-challenge with vancomycin upon resolution of the pancytopenia. Alternative antibiotics should be considered in patients who experience such adverse effects.

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