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NEUTROPENIA CAUSED BY PIPERACILLIN-TAZOBACTAM: A CASE REPORT

Ranjith Kumar Sreerama* and Pavan Kumar

Assistant Professor, Department of General Medicine, Tagore Medical College & Hospital, Chennai - 600127

ABSTRACT

In the testing phase of antibiotic development, it is common to utilise piperacillin/tazobactam (TZP) to treat a wide range of infections. It's safe, according to most people. Treatment with TZP may cause neutropenia, an uncommon but dangerous side effect. The case of ceftriaxone neutropenia in an elderly patient is given in this paper based on clinical data and blood tests. The patient's leucocyte and neutrophil counts began to decline on the third day of taking the medicine and continued to decline on the fifth day. TZP has the possibility to trigger neutropenia in as little as 10 days, according to our research. In order to further understand the link between TZP treatment and neutropenia, more study is required.

Key words: Tazobactam; Neutropenia; Piperacillin.

INTRODUCTION

When used in conjunction with another drug like ureidopenicillin, it is more effective against beta-lactamase-producing bacteria and has a broader range of action than either agent alone. Hypersensitivity responses, neurotoxicity, hepatotoxicity, electrolyte and acid-base abnormalities, but also bleeding issues are only some of the side effects that have been reported. It has also been proven to cause neutropenia, thrombocytopenia, and hemolytic anaemia when used with beta-lactam antibiotics. Piperacillin may produce comparable side effects, according to a recent comprehensive review of the available evidence. Non-marginal pool of circulating neutrophils is defined as less than 1,500 cells/mm3 of non-marginal pool. Classification of the illness is done by using the absolute neutrophil count (ANC), which counts neutrophil granulocytes in the blood. One thousand to 1,500 cells/ mm3 is considered mild neutropenia, whereas one thousand to 500 cells/ mm3 is moderate neutropenia and one thousand to 500 cells/ mm3 is severe neutropenia. As synovium or mature cells, neutrophils are found in the bone marrow.

Patients with neutropenia are at an increased risk of infection are more vulnerable to infection because of the lower amount of neutrophils in their blood, and the risk of bacteremia increases with the severity and duration of the condition.

Neutropenia may occur if TZP is used for an extended period of time. According to the majority of studies, neutropenia seldom develops before 10 days of medication. On the 17th day of TZP treatment for a brain infection, a patient developed agranulocytosis, according to one of the published reports. TZP's neutropenia-inducing mechanisms are unclear; however piperacillin is believed to cause myeloid cell development to halt. In a published case report, IgG antibodies against penicillins were shown to induce neutropenia in a patient.

TZP-treated pneumonia patient developed neutropenia soon before the 10-day mark. Piperacillin must be monitored for haematological effects even for a small period of time.

Corresponding Author: - Dr. Ranjith Kumar Sreerama **Email:**

Results

Diabetic and BPH sufferer, 105, admitted to ICU at Tagore Medical College & Hospital,

Melakottaiyur, Chennai with dyspnea requiring glimepiride and alfuzosin treatment for both conditions. Upon admission, his temperature was 37 degrees Celsius, his blood pressure was 90/50 mm Hg, his oxygen saturation was 76%, and his pulse rate was 76 beats per minute. A pleural effusion and pneumonia were seen in the right lower lobe on a chest X-ray. Every eight hours, he received 4.5 g of IV TZP. Microcytic hypochromic anaemia and a high white blood cell count (4,300 cells/ mm^3) were discovered during the patient's first checkup (day 1). (47 percent neutrophils). The patient's hemodynamics maintained and dyspnea diminished over the second and third days of therapy. Neutropenia and a 2,900/ mm^3 white blood cell count were found on day 3 in this patient (neutrophils 47 percent). On day 5 of therapy, the white cell density was 2900 cells/ mm^3 and neutropenia was 25%. It's (Table 1) The patient was given levofloxacin instead of TZP. It just took three days for the white cell count to return to normal once TZP was stopped (data not shown). Culture of sputum came out negative

Table 1: Results of Laboratory Tests During Hospitalization.

	Day 1	Day 3	Day 5
white blood cells	4,300	2,800	2900
Neutrophils	47%	45%	25%
Lymphocytes	40%	41%	61%
Eosinophils	1%	2%	2%
Monocytes	9%	8%	9%
Hematocrit	31	29	28
Hemoglobin	11.1	10.4	9.2
Red blood cells in the body.	4.24	3.7	3.59
To put it another way (MCV)	76	75	75
Corpuscular haemoglobin concentration (MCH)	24	25	25
Concentration of haemoglobin in the corpuscles (MCHC)	31.9	32.9	33.1
Platelets	212,000	171,000	148,000

Discussion

Piperacillin, a penicillin derivative, may be used to treat infections caused by certain bacteria (Pseudomonas aeruginosa, Klebsiella, etc.). For more severe infections, dosages of more than 12 g/day are required. Mild infections need a daily dose of 4-12 g. High cumulative dosages in clinical trials are typically required to avoid neutropenia as a rare adverse effect. Piperacillin therapy may cause Neutropenia, a rare but possibly dangerous side effect.

Neutropenia and inhibition of progenitor cells have been documented after the use of piperacillin and TZP. Piperacillin use has been linked to neutropenia in a wide range of patients, from 0.04 percent to 34 percent, according to a thorough review of studies on the subject.
More than half of patients given piperacillin for osteomyelitis developed neutropenia after many than ten days of therapy, according to a retrospective cohort study.

For neutropenic patients, the cumulative doses of piperacillin were higher than for non-neutropenic patients.
Piperacillin-treated patients with osteomyelitis, pneumonia, cystic fibrosis, and abscesses developed neutropenia 15 days after the start of treatment in six prior cases. Patients between the ages of 19 and 50 who received TZP (4.5 g IV every 8 h) to heal pancreatic infections, pneumonia, and osteomyelitis developed neutropenia 16 to 25 days after starting the drug treatment.

Additionally, the patient was given amikacin and metronidazole. for this particular case. However, considering that the metronidazole was administered 12 hours before to the onset of the neutropenia and that amikacin had not previously been related to neutropenia, this seemed implausible. A bone marrow test yielded a maturation array of granulocytic cells. TZP was stopped as soon as it was suspected of causing bone marrow suppression, and neutrophil counts returned to normal within four to six days.

Six incidences of fever, malaise, and headache were observed in a retrospective examination of 38 children with sickle cell disease (aged 14) who were treated with TZP courses. Between the 11th and 15th days of therapy, three of the 38 children developed neutropenia. When it came to TZP, this group had a far larger cumulative dosage than the control group. After TZP was stopped, the blood cell count returned to normal.

AERS Database of the FDA also found 366 incidences of haematological abnormalities after piperacillin therapy (50 percent neutropenia and 27 % leucopenia), with neutropenia appearing in 62 of these incidences between days 5 and 15.

Some patients have had uncommon adverse effects of the drug, such as neutropenia, mostly due to bone marrow toxicity from TZP at high cumulative doses, as recorded in many cases. 91-year-old patient developed neutrtropenia without any sign of cumulative dose. As a

consequence, we assume the drug, instead of the cumulative amount, is to blame for the neutropenia. This connection needs additional investigation.

Conclusion

TZP has a significant bone marrow suppression adverse effect, specifically neutropenia, which should have been taken into account when practising medicine with this medication. Despite previous studies finding that neutropenia appeared after 10 days of starting piperacillin medication, this study found that it appeared after just 3 days. Research is required to identify the link on how long it takes for neutropenia to set up after starting TZP medication.

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