A Case Report of the First Platelet Transfusion Refractoriness in a Patient with Acute Myelocytic Leukemia

Shengke Tu et al., First Platelet Transfusion Refractoriness in a AML

Shengke Tu, Hongjie Fan, Ziwei Shi, Xiaolan Li, Min Li, Kui Song

Abstract

BACKGROUND
Platelet transfusion is of great significance in the treatment of thrombocytopenia caused by myelosuppression during intensive chemotherapy in patients with acute leukemia. In recent years, with platelet transfusion increasing, ineffective platelet transfusion has become increasingly prominent. Generally speaking, platelet antibodies can be produced after repeated transfusion, thus rendering subsequent platelet transfusion ineffective. Now a case of the first platelet transfusion refractoriness in a patient with acute myelocytic leukemia is reported. Due to the rarity of such cases in clinical practice, there have been no relevant case reports so far.

CASE SUMMARY
Platelet transfusion is of great significance in the treatment of thrombocytopenia caused by myelosuppression during intensive chemotherapy in patients with acute leukemia. In recent years, with platelet transfusion increasing, ineffective platelet transfusion has become increasingly prominent. Generally speaking, platelet antibodies can be produced after repeated transfusion, thus rendering subsequent platelet transfusion ineffective. Now a case of the first platelet transfusion refractoriness in a
patient with acute myelocytic leukemia is reported. Due to the rarity of such cases in clinical practice, there have been no relevant case reports so far.

CONCLUSION
In conclusion, we reported a rare case of first platelet transfusion failure in a patient with AML during induction chemotherapy, which may be related to the production of platelet antibodies induced by antibiotics and excessive tumor load. This also suggests that we should consider the influence of antibiotics when a rare situation of first platelet transfusion failure occurs in patients with AML. When platelet antibodies are produced, immunoglobulins can be used to block antibodies, thereby reducing platelet destruction. For patients with PTR, both immune and non-immune factors need to be considered and combined in clinical practice along with individualized treatment to effectively solve the problem.

Key Words: acute myelocytic leukemia; First platelet transfusion refractoriness; Myelosuppression


Core Tip: acute myelocytic leukemia; First platelet transfusion refractoriness; Myelosuppression

INTRODUCTION
Platelet transfusion refractoriness (PTR) is to point to in two or more consecutive patients who underwent enough doses of random donor source of ABO blood group consistency of platelet after infusion, blood platelet counts not seen effectively increase[1, 2]. In this case report, the patient presented with a rare initial platelet
transfusion that was ineffective. Due to the rarity of such cases in clinical practice, there have been no relevant case reports so far.

2 CASE PRESENTATION

Chief complaints
A 51-year-old female patient went to the hospital with throat pain and abnormal blood cells for 4 days.

History of present illness
A 51-year-old female patient went to the hospital with throat pain and abnormal blood cells for 4 days. The patient herself stated that he had a sore throat accompanied by retching and diarrhea with no obvious causes 4 days ago, while details were unclear. A blood routine examination at the local hospital showed elevated leukocyte and referral to the superior hospital for treatment was recommended.

History of past illness
Past medical history included intermittent ecchymosis of limbs for 20 years, low platelet count for 20 years, recurrent sore throat and hoarseness for more than 10 years, and surgery for a pharyngeal cyst.

Personal and family history
No special

Physical examination
Upon examination, the patient’s vital signs were stable. Physical examination revealed an enlarged lymph node with a diameter of about 1 cm in the right axillary fossa and two ecchymoses with a diameter of 0.5 cm in the right lower limb. Moreover, there was tenderness in the sternum, tenderness beneath the xiphoid process,
and percussion pain in the liver area. The lips were slightly pale and the pharynx was not red.

**Laboratory examinations**

Auxiliary examinations (August 12, 2021) in the emergency department revealed the following: leukocyte 148.22*10^9/L, erythrocyte 3.28*10^{12}/L, hemoglobin concentration 105g/L, and platelet count 97*10^9/L.

**Imaging examinations**

No

**FINAL DIAGNOSIS**

acute myelocytic leukemia (M2 type FLT3, IDH1, NPM1, NRAS (+) high-risk group).

**TREATMENT**

On August 22, 2021, "1A" (IDA 10mg d1-3 Ara-C 0.2g d1-5) chemotherapy was performed

**OUTCOME AND FOLLOW-UP**

In addition, the chemotherapy process went smoothly since symptomatic and supportive treatments.

**DISCUSSION**

PTR occurs in a patient who has received two or more consecutive and sufficient doses of ABO blood group from a random donor source with platelet consistency, and after infusion blood platelet counts do not effectively increase [1, 2]. Studies[3] have found that platelet transfusion rates can be as ineffective as in 25–60% of the cases. In
this case report, the patient presented with a rare initial platelet transfusion that was ineffective.

PTR is a serious problem often encountered in clinical transfusion therapy, mainly observed in patients with blood system diseases requiring platelet transfusion. Existing studies[4, 5] have shown that ineffective platelet transfusion is mainly caused by immune and non-immune factors (Table 1). Previous studies have found that PTR mainly occurs in patients with multiple or repeated blood transfusions but in this case report, the patient suffered from ineffective initial platelet transfusion, and the reason was worth exploring. At present, PTR is mainly considered to be caused by tumor load and the production of platelet antibodies induced by antibiotics.

In this case, severe myelopathic depression occurred during induction chemotherapy. To prevent fungal infection, cefoperazone sulbactam sodium, teicolanin, meropenem antibacterial, and voriconazole were successively administered. Previous studies[6-8] have reported that cefoperazone sulbactam sodium can act as an immune mediator in vivo, causing immune responses and destroying platelets, and simultaneously binding to complete antigens as haptens and carriers in vivo to stimulate antibody production in the body. After drug sensitization, contact with the same drug to form an antigen-antibody complex and adsorption on the platelet membrane can activate complement and quickly clear the circulation of platelets. This may be one reason why the patient's first platelet infusion was ineffective. Li et al[9] found that the higher the white blood cells in patients with leukemia, the more serious the destruction of blood vessel walls. Elevated white blood cells can induce the formation of a thrombus and platelet aggregation. Activation and consumption increase in the process of thrombus formation, thereby affecting platelet infusion. In the second cycle of chemotherapy, the patient also showed myelosuppression and platelet count decline and platelet infusion was effective. At the beginning of chemotherapy, the patient's white blood cells basically returned to the normal range and the tumor load decreased. So we considered that high tumor load might also be one of the reasons why platelet transfusion was ineffective.
CONCLUSION

In conclusion, we reported a rare case of first platelet transfusion failure in a patient with AML during induction chemotherapy, which may be related to the production of platelet antibodies induced by antibiotics and excessive tumor load. This also suggests that we should consider the influence of antibiotics when a rare situation of first platelet transfusion failure occurs in patients with AML. When platelet antibodies are produced, immunoglobulins can be used to block antibodies, thereby reducing platelet destruction. For patients with PTR, both immune and non-immune factors need to be considered and combined in clinical practice along with individualized treatment to effectively solve the problem.