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Factors influencing platelet refractoriness in hematology-oncology patients — a retrospective analysis of 52 cases

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Background

Most hematology-oncology patients receive platelet transfusions when their platelet count drops below a threshold. Up to 35% of patients who depend on platelet transfusion support become refractory to platelets. Refractoriness is defined as two consecutive platelet transfusions with a 24-hr corrected count increment (CCI) below $5x10^9$/L. Of this refractoriness, 3-5% can be attributed to alloimmunization. This retrospective analysis investigated patient and platelet transfusion factors that might contribute to platelet refractoriness in the remaining cases.

Methods

A clinical study conducted at the Vancouver General Hospital, BC, Canada from 2011 to 2014 enrolled 200 hematology-oncology patients with informed consent. Patient data (age, sex, diagnosis, first planned treatment, blood group, human leukocyte antibody (HLA) status, medications, body temperature, WHO bleeding score, date of discharge or death, length of stay), pre- and post-transfusion platelet counts and platelet transfusion data (blood group, platelet dose, platelet activation status) were prospectively collected. Retrospective analysis identified 52 refractory patients. Their patient and transfusion data were assessed and compared to non-refractory patients.

Results

Fifty two of 200 patients (26%) were refractory — they showed insufficient 24-hr CCIs following two consecutive transfusions. Only 3 of 52 refractory patients received HLA matched platelets. Refractory patients received 580 of the total 997 transfusions in the study, and 48% of these platelet transfusions were activated, identified by their high microparticle content. Refractory patients were 56% male, 51.5 ± 13 years of age, and were diagnosed with ALL (9.6%), AML (59.6%), CML (7.7%), MDS (11.5%) and other (11.5%) blood cancers. The baseline platelet counts were 60 ± 57. WHO bleeding scores of 2 or 3 on days of transfusion were rare, 5.3% for refractory compared to 2.2% for non-refractory patients. Refractory patients received over 3 times more activated platelet transfusions and their body temperature was overall 0.5° higher than for non-refractory patients. Their length of stay was 27 ± 11 compared to 19 ± 9 days and their survival rate was 88% compared to 98% for non-refractory patients.

Conclusion

Retrospective analysis did not reveal alloimmunization, bleeding or patient demographics as major factors associated with tplatelet refractoriness. However, refractory patients had a higher occurrence of fever, and received more activated platelets than non-refractory patients. Additional studies are needed to determine whether platelet activation status and fever are independent, or if immunomodulatory factors associated with activated platelets contribute to elevated body temperature. Furthermore, the relationship between activated platelets, fever and platelet refractoriness in hematology-oncology patients warrants investigation.

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