Cumulative effect in transfusion related acute lung injury

Sir;

Transfusion-related acute lung injury (TRALI) is a serious blood transfusion complication. TRALI was first reported in the 1950's with the initial case series in 1966, and its fatality was reported to the U.S. Food and Drug Administration Center for Biological Evaluation and Research in 1992.[1,2] TRALI is defined as an acute onset of bilateral infiltrates and hypoxemia in the absence of increased left atrial pressure. It is the leading cause (around 50% of cases) of transfusion-related fatalities and occurs approximately 1 in every 5000 transfusions with mortality of 6 - 9%.[2-4] Although TRALI is typically associated with plasma components, such as platelets and fresh frozen plasma, some cases have been reported with packed red blood cells (P.C) since there was some residual plasma in it. It seems that certain patient groups may be significantly at higher risk.[5,6]

We describe TRALI in a 24-year-old male multiple traumatized patient with left femur and humerus fractures, suffering from severe respiratory compromise several hours after packed red blood cell transfusion. Symptoms typically began 2 hours after packed red blood cell (P.C) transfusion in the ward and were fully manifest within 6 hours of 2nd P.C transfusion in the intensive care unit (ICU). There wasn't any positive finding in his past medical history, review of systems, and family history. Patient's vital signs were stable accompanied with tachypnea, tachycardia and mild fever (HR: 130, RR: 32, T: 38.2) after 1st P.C transfusion. The patient was transferred to the ICU with probable diagnosis of pulmonary emboli. In the ICU, he received 2nd P.C due to his anemia (Hb: 7.4). His vital sign became worse and unstable, and the serial arterial blood gas of our patient showed metabolic acidosis accompanied with sever hypoxia (PH: 7.26, PCO_2: 28, HCO_3: 14, PO_2: 68, PaO_2: 72 - 78%, Na: 145, K: 4.8, Hb: 7.2). He had a marked respiratory reaction, associated with bilateral pulmonary infiltrates in the chest x-ray. Oro-tracheal intubation after a deep sedation was done. We prescribed ventilator support (Mode: ACMV, Vt: 4 - 5 ml/kg, RR: 25 - 28 cycle/min, PEEP: 14 - 18 CmH_2o, I/E:1/1.2, FiO_2: 100%) accompanied with muscle relaxant and propofol infusion for 72 hours. Central venous line from internal jugular vein prepared for the patient, and its pressure was measured. In ECHO, there was no evidence of fluid over load or heart failure. The diagnosis of TRALI is based primarily upon clinical signs and symptoms, not laboratory findings, and there is no single test for this condition.[2,4] We could confirm TRALI, by rolling out other probable diagnoses.

In about 80% of affected patients; like our patient, pulmonary infiltrates appear at the time of the reaction and will be resolved within 96 hours.[4,7] After recovery from TRALI, the patient was prepared for orthopedic surgery. Transfusion couldn't be avoided during the operation. In spite of recommendations, P.C was transfused to the patient, and then he showed the evidence of TRALI and was admitted to the ICU again. Although our patient was discharged from the hospital without any permanent sequelae, we considered a cumulative effect in pathogenesis of TRALI.

TRALI is an adverse life-threatening event of transfusion, which has an increasing incidence, even though it is probably under diagnosed and underreported.[2,4,6] It is indeed PMN-mediated and has similar pulmonary findings to acute lung injury and acute respiratory distress syndrome. A two-hit hypothesis has been suggested wherein pre-existing pulmonary pathology (the first-hit) leading to localization of neutrophils to the pulmonary microvasculature. The second hit occurs when the aforementioned antibodies are transfused and attached to and activates neutrophils, leading to release of cytokines and vasoactive substances that induce non-cardiac pulmonary edema.[4,5,7] In this case, trauma was the first hit as a precipitating factor, and we consider transfusion as second hit. Susceptibility to suffering from TRALI in specific patients is predictable.[1,4,5] We recommended washed red blood cell transfusion to these patients.

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