Transfusion-related acute lung injury: A rare case after single packed red blood cell unit transfusion

Transfusion-related acute lung injury (TRALI) is a rare but serious adverse event of allogeneic blood component transfusion, manifested typically by shortness of breath, a non-productive cough, fever and hypotension. It was considered a clinical diagnosis by Popovsky and Moore[1] with an estimation of antibody-mediated TRALI, occurring at a rate of 1 in 5000 transfused units and non-immune TRALI, at a rate of 1 in 1120 cellular blood components, with one incidence per 453 transfused platelet concentrates and one incidence per 4410 transfused packed red blood cells (PRBCs).[2,3]

We here present a rare case of TRALI requiring intensive care unit (ICU) management that had occurred after transfusion of single PRBC unit. The present case was a 68-year-old female, with newly diagnosed acute myeloid leukaemia who had tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) disease (COVID-19) and had a non-healing ulcer on the right thigh., Laboratory testing revealed a low haemoglobin (7.6 g/dL) and low platelet count (8,000/mm^3); blood group tested B-positive. The patient was admitted for PRBC and platelet transfusions. One unit of B-positive PRBC (12 days old, pre-storage leucoreduced and compatible with the patient's serum at Anti human globulin (AHG) phase in gel card) was released for transfusion from the blood bank. The patient was stable prior to transfusion, however, she developed difficulty in breathing, low-grade fever, chills and cyanosis within 2 h after PRBC transfusion. Arterial oxygen saturations measured by pulse oximetry (SPO_2) were 68% at room air and 94% with 4 L oxygen. A transfusion reaction was suspected and a differential diagnosis of TRALI, transfusion-associated circulatory overload (TACO) and sepsis was made.

Chest X-ray showed extensive bilateral pulmonary infiltrates suggestive of acute pulmonary microvascular damage leading to interstitial and alveolar infiltrates. The chest X-ray of the patient before and after transfusion are shown in Figure 1a and b. Central venous pressure and pulmonary capillary wedge pressure were found to be normal (4 mmHg and 6 mmHg, respectively), thereby excluding the possibility of TACO.

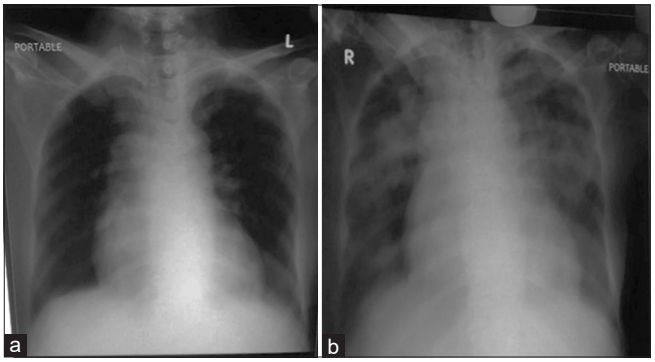

Figure 1: Chest X-ray (bed-side portable) before transfusion (a). Chest X-ray (bed-side portable) of the same patient after transfusion (b)

The patient was managed symptomatically. Even with oxygen administration, her symptoms did not improve. Hence, she was shifted to ICU and non-invasive ventilation support was instituted. Laboratory testing revealed pancytopenia and raised procalcitonin (18.70 ng/mL). Chest X-ray showed bilateral opacities. The bacterial cultures from the patient and PRBC unit were negative. She responded well to the treatment gradually improved and she became asymptomatic in 72 h. Repeat chest X-ray was normal; and SPO_2 was 94% on room air.

Testing for anti-human leucocyte antigen (anti-HLA) and anti-human neutrophil antigen (anti-HNA) antibodies in patient and donor samples could not be done due to resource limitations. Details from a donor questionnaire revealed that blood was collected from a 20-year-old male donor without any significant history suggestive of anti-HLA antibody formation. In a study,[2] only 25% of TRALI cases had revealed anti-HLA antibodies in the donor plasma and there were no antibodies detected in patients or donors in 10%–15% cases of TRALI.[2]

In the present case, TRALI was suspected because of the rapid onset and significant drop in oxygen levels (partial pressure of arterial oxygen 65 mmHg) with characteristic features on chest X-ray post-transfusion and non-cardiac pulmonary oedema after the PRBC transfusion. Furthermore, the patient does not have any pre-existing acute lung injury (ALI) or any associated risk factor for ALI. Similar findings were reported in another study[4] where TRALI was reported in a 10-year-old male

child following platelet transfusion collected from a young male donor.

To prevent antibody-mediated TRALI, it is recommended that transfusions containing anti-leucocyte antibodies should be avoided, for example, fresh frozen plasma derived only from male donors should be used because of the high anti-leucocyte antibody positivity rate of females with a history of pregnancy, and donors who have previously been associated with TRALI should also be excluded.[5,6] However, this strategy has not completely eradicated the complication. In the past few years, research has identified patient-related risk factors for the onset of TRALI, which have facilitated physicians to take an individualised approach to patients who need transfusion.[7] As well as antibodies, plasma proteins and biological response modifiers are also associated with the onset of TRALI. These are contained in plasma; therefore, it has been reported that washed platelet preparations, from which as much plasma as possible is removed, are effective for preventing TRALI.[8]

The present case emphasises that TRALI be ruled out first in any patient showing acute respiratory distress within 6 h of transfusion, with prompt management. Notification of transfusion services is crucial to ensure that a proper investigation is carried out and at-risk donors and recipients can be identified, and risk reduction measures can be adopted.

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Conflicts of interest
There are no conflicts of interest.

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