

Transfusion-Related Acute Lung Injury (TRALI)

As we have recently received some reports of serious adverse transfusion reactions, which were suspected to be TRALI, we are forwarding some up-dated information for your notice board.

Presentation

TRALI generally manifests itself as acute respiratory distress, fever, and hypotension (hypertension is present in 15% of cases) during or after transfusion with associated bilateral pulmonary oedema, and with no evidence of cardiac compromise or acute volume overload. Symptoms typically begin within 1-2 hours of transfusion and are usually present by 4-6 hours. Chest X-rays classically demonstrate white-out by interstitial and alveolar infiltrates, but in the first few hours a patchy pattern may be observed. The incidence of TRALI is about 1:5000 transfusions, but this may be significantly under diagnosed.

Implicated Products

TRALI has been more frequently described in transfusions containing significant amounts of plasma i.e. fresh frozen plasma (FFP) and platelets, but it has also been associated with cryoprecipitate, red cell transfusions and intravenous immunoglobulin. Solvent detergent plasma (SD plasma) has not been implicated in TRALI probably because of the pooling process involved during manufacture.

Pathophysiology

TRALI is thought to result from the presence of anti-HLA and/or anti-granulocyte antibodies mainly in the plasma of multiparous female donors, or less commonly in the plasma of donors who have received previous transfusions. One or both of these antibody types have been found in 89% of TRALI cases, although there have been documented cases where there were no associated antibodies. It has been hypothesised that white cell-antibody interaction causes activation and sequestration of white cells in the pulmonary microvasculature. The granulocyte metabolic products released give rise to endothelial injury, leading to increased endothelial permeability and consequent exudation of fluid and protein.

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During 2001, the NHO received three reports of suspected TRALI. Two of these reports, which involved the transfusion of red cells, have been confirmed as TRALI. The third, which is still under investigation, is related to the transfusion of two units of FFP.

Differential Diagnosis

- The symptoms of *transfusion associated circulatory overload* usually begin within several hours of the transfusion of any type of component or product. There may be other symptoms of cardiac insufficiency. Often there is pre-existing cardiovascular or respiratory disease.
- The respiratory distress and cyanosis of *anaphylactic transfusion reactions* is related to bronchospasm and laryngeal oedema, not to pulmonary oedema. Furthermore, cutaneous manifestations are common and typically involve the trunk, face and neck. Fever, generally, is not a manifestation of anaphylactic transfusion reactions.
- While fever and hypotension are frequent symptoms of *bacterial contamination*, respiratory distress is not as frequently observed. The onset of symptoms is usually within 1-2 hours of commencing the transfusion. Although platelets are most frequently implicated due to their ambient storage conditions, red cell transfusions may also be associated with this complication.
- TRALI is clinically indistinguishable from *acute respiratory distress syndrome (ARDS)*. ARDS should be considered if the presentation is over 12 hours post transfusion, or if the condition fails to resolve within 72 - 96 hours. This should also be considered in patients with clinical disorders associated with ARDS e.g. pneumonia, sepsis, aspiration of gastric contents and severe trauma.

Treatment

TRALI is associated with significant patient morbidity and the mortality rate may be as high as 25%. Generally patients will require oxygen support, with approximately 70% requiring mechanical ventilation. In about 80 percent of cases the pulmonary infiltrates evident on radiography resolve almost completely within 96 hours and arterial blood gases return to baseline values during this period. It is generally agreed that ventilatory assistance (oxygen and in severe cases mechanical ventilation) and fluid replacement (0.9% NaCl) are indicated for the treatment of TRALI. Diuretics are contraindicated. Pressor agents are occasionally required to control fluid replacement resistant hypotension. No significant role has been determined, as yet, for the use of corticosteroids.

Recommendations

1. Be alert that any respiratory distress occurring during, or within six hours following, blood or blood component transfusion could potentially be TRALI. Discontinue the transfusion immediately, begin oxygen and supportive therapy.
2. Patient samples required for follow-up investigations include: 10mls in EDTA tube and 10mls in plain tube. Please contact the NHO for advice re same.
3. Notify the Blood Centre that supplied the blood component of the unit numbers of the components used.
4. Report TRALI as a serious adverse reaction to transfusion to the NHO.

Differential Diagnosis

	Fever	BP	Pulse	Clinical features	Onset	Investigation
TRALI	↑	↓↑	↑	Bilateral Pulmonary Oedema	During / up to 1-6 hours after	Granulocyte serology
Circulatory Overload	-	↑	↑	Cardiac Failure Pulmonary Oedema Positive Fluid Balance	During/after	ECG, cardiac enzymes, ECHO
Anaphyactoid reaction	-	↓↓	↑	Rash Dyspnoea	Immediate occurring up to 2 hours	IgA Levels
Bacterial infection	↑	↓↓	↑	Endotoxic Shock	During or 1-4 hours after	Blood cultures of patient and blood component
ARDS	↑	↓↑	↑	Bilateral Pulmonary Oedema	Consider if onset later than 6 hours	Investigations for underlying conditions

Bibliography

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**For further information contact:
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