Transfusion related lung injury (TRALI): An update

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Introduction

– Background
– A case report
– Data from Serious Hazards of Transfusion Scheme (SHOT)
– Trends following change to preferential use of male plasma
SHOT definition

• Acute dyspnoea with hypoxia and bilateral pulmonary infiltrates during or within six hours of transfusion, not due to circulatory overload or other likely cause.
What causes TRALI?

- Antibodies to white cell antigens repeatedly implicated in TRALI since Popovskvy reports in 1980s
- More recent reports implicating other potential neutrophil priming agents eg lipids, in general, less severe pulmonary reactions
A case report

- 17 yrs male with congenital liver disease
- complicated by
  - hypersplenism and thrombocytopenia
  - varices in oesophagus
  - high risk of bleeding from varices
- Planned admission for treatment of varices
Platelet transfusions

• On day of admission
  – Low platelet count and prolonged nose bleed so transfused with 1 dose of platelets

• Next day
  – Endoscopic banding under GA
  – Further platelet unit commenced in theatre at 10.30hrs and continued during his procedure
Progress in theatre

- 3 bands applied to varices without difficulty
- Developed episodes of hypoxia requiring increased oxygen administration whilst under anaesthetic
Post-operative progress

- Endotracheal (ET) tube removed but oxygen saturation dropped despite 100% O2 by mask and bag
- BP dropped from 160/80 to 85/50 then 50/30
- Temperature increased to 40°C
- Reintubated and “frank fountain-like pulmonary oedema” up ET tube
- Chest X Ray (CXR) showed bilateral pulmonary infiltrates
30 minutes post transfusion (TRALI)
Intensive Care

- Transferred to intensive care unit
- Mechanical ventilation
- Adrenaline to treat hypotension
- TRALI suspected but diuretics and antibiotics given to cover possibility of heart failure or infection as cause of problems.
4 hours post transfusion (TRALI)
20 hours post transfusion
Three days later

- Still on ventilator and now developed chest infection and kidney function deteriorating
- Developed accumulation of fluid in chest secondary to infection
- 1L fluid drained
Six days later

- Much better
- Endotracheal tube removed, spontaneous breathing
- Kidney function recovering
- Temperature normal
- Subsequent complete recovery and discharge
Was this TRALI clinically?

Clinical features:
- Within 6 hours of transfusion
- Bilateral infiltrates
- Hypoxia
- Hypotension and fever
- Other possible risk factors for respiratory deterioration - GA, transient circulatory overload

** Required by definition
Clinical features SHOT TRALI reports
1996-06 n = 195

- ITU 73%
- Hypotension 52%
- Ventilator 47%
- Fever 37%
- Transfusion related 21%

death
Donor Investigations

- Apheresis platelets donated by female donor
- 2 pregnancies 25 and 28 years ago, no transfusions
- Multiple HLA Class I and Class II antibodies including HLA-A2 and DR-11 concordant with patient

Case conclusion: TRALI due to HLA Class I and Class II donor antibodies
SHOT TRALI investigations 2000-2007

- All donors found to have matching white cell antibodies in SHOT TRALI cases have been female with a history of pregnancy +/- transfusion as the immunising event
- Concordant donor antibody found in 73 of 114 (64%) complete investigations Most common concordant HLA antibodies: HLA-DR4, -DR52 and HLA-A2 (13%)
- Most common HNA antibody HNA1a
NBS TRALI risk reduction project
2003

Stimulated by SHOT data and user concerns
Which components?

- risk 7 times higher after plasma rich components (eg FFP, platelets)

- than plasma poor (eg red cells in optimal additive solution)
Assumptions for TRALI risk reduction

- Donor HLA/HNA antibodies are an important cause of TRALI
- Highest risk components are FFP and platelets
- Highest risk donors are previously pregnant women
- Other possible causes of TRALI not addressed by the project
Project

- No more new questions for donors
- Male plasma as far as possible for FFP and plasma to platelet pools
- National roll-out October 2003

- 2007 NBS produced 94% FFP and 87% plasma for platelet pooling from male donors
DID IT WORK?
TRALI cases with concordant antibody by component and year 2003-2007
SHOT analysis TRALI cases 1996-2007 (n= 219)
TRALI after Male Plasma Initiative

- Fewer total reports of suspected TRALI
- Fewer reports of TRALI following FFP and platelets
- Fewer deaths attributed to TRALI
- 2006: dip in reports possibly related to MHRA/SHOT website.
- 2007: more reports of TRALI relating to components with less plasma reported (higher suspicion). More than half 2007 reported TRALI events occurred in 2006 or 2005
TRALI post male plasma

- 2006 and 2007 lowest TRALI death rates since 1996
- 2007 increasing recognition of cases associated with components containing relatively little plasma (4 RBC OA, 4 platelet pool, buffy coat only)
Further TRALI risk reduction?

- Continued emphasis on appropriate transfusion
- NBS apheresis platelets
  - 75% male donations
  - preferential male recruitment since 2006
  - screening female donors for HLA and HNA antibodies to be introduced soon.

(This screening would have excluded the implicated donor in the case report)
Conclusion

- SHOT data very useful for assessing impact of male donor plasma initiative
- TRALI case reports and deaths have been reduced but not eliminated
- Maintain awareness of this serious adverse event
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