



# TRANSFUSION TALES:

...presented for your learning

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## September 2011

**Patient Case:** Jane is a 56 year old undergoing chemotherapy treatment for ovarian cancer. Today her platelet count is less than  $10 \times 10^9/L$ . Jane's physician orders 1 adult dose of platelets. During her treatment, she has required multiple transfusions with no reactions noted. Vital signs pre, after 15 minutes and on completion of the transfusion are WNL (Within Normal Limits). Jane is being discharged within an hour of the transfusion, when suddenly she develops a cough and shortness of breath that is worsening. Jane's oxygen saturation is 80%; she is hypotensive (86/40 mm Hg); and her temperature has increased to 38.0C. Oxygen at 3 liters per minute via nasal prongs is initiated.

**QUESTION 1** Which of the following investigations are helpful in determining the etiology of Jane's reaction to the platelet transfusion (choose all that apply).

- Capillary gases
- Urinalysis
- Chest X-Ray
- Blood cultures (both the patient and the platelet product)
- Direct Antiglobulin Test / Antibody Screen
- Clinical assessment of volume status

Critical Care Outreach Team (CCOT) is called to assess Jane. She is transferred to Intensive Care and intubated due to increasing respiratory effort and poor oxygenation. A portable chest X-ray reveals bilateral pulmonary infiltrates. There is no clinical evidence of volume overload, pulmonary pressures are not elevated. The lab tests do not indicate RBC incompatibility.

**QUESTION 2** The most likely explanation for Jane's platelet transfusion reaction is:

- Transfusion Associated Circulatory Overload (TACO)
- Anaphylactic transfusion reaction
- Hemolytic transfusion reaction
- Transfusion Related Acute Lung Injury (TRALI)
- Bacterial contamination of the platelet product

**QUESTION 3** To reduce the incidence of TRALI, the Canadian Blood Services (CBS) has implemented which of the following strategies:

- Leukoreduction of all cellular blood components
- Provision of CMV negative and Irradiated blood products for at risk patients
- Plasma / platelets collected from predominately male donors (female donor plasma sent for fractionation to produce immune globulins, albumin etc.)
- Suspension of red cells in a nutrient solution
- Culturing of all platelet products prior to release to hospitals

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## ANSWERS:

1. All listed tests are important for the differential diagnosis    2. (d)    3. (c)

**DISCUSSION:** Transfusion Related Acute Lung Injury (TRALI) is a form of noncardiogenic pulmonary edema presenting during or within 6 hours of transfusion. Signs / symptoms include respiratory distress with a marked decrease in oxygen saturation. Fever, rigors, tachycardia, and hypotension may also be present. TRALI results in damaged pulmonary endothelium, capillary leak syndrome and pulmonary edema. Chest X-Ray reveals interstitial and alveolar infiltrates. Pulmonary pressures are not elevated.

**ETIOLOGY:** Possible mechanisms hypothesized:

- Passive transfer of HLA or granulocyte antibodies from donor to recipient (most often the blood products implicated are plasma, platelets or packed red cells)
- Biologically active lipids in the transfused blood product

**MANAGEMENT:** Supportive care, possibly including

- Mechanical ventilation
- Vasopressors

Diuretics and steroids are not believed to be useful in treating TRALI.

**DIFFERENTIAL DIAGNOSIS:**

- Anaphylactic reaction could present similarly, but usually occurs close to the start of transfusion and most often increase in temperature is not seen.
- Hemolytic reaction does not usually present with significant pulmonary symptoms. Direct Antiglobulin Test, Group and Antibody Screen can rule out red cell incompatibility.
- Bacterial contamination of the platelet product should be considered and can be ruled out by completing blood cultures on both the patient and the product. Antibiotics should be initiated only if additional symptoms indicate.
- Transfusion Associated Circulatory Overload (TACO) and TRALI are initially often difficult to differentiate. There is clinical evidence of volume overload in TACO, whereas with TRALI there is no clinical evidence of volume overload. Typically TACO leads to hypertension while hypotension might be a feature of TRALI.

**PROGNOSIS:** In many cases of Acute Lung Injury (ALI) or Acute Respiratory Distress Syndrome (ARDS) lung damage is irreversible; however the pulmonary injury with TRALI is generally transient. Most patients recover within 24 to 72 hours.

Currently TRALI is considered most common cause of transfusion-associated fatalities. Of reported TRALI cases, 72% required mechanical ventilation and 5-10% resulted in death.<sup>1</sup>

**PREVENTION:** The key to minimize all transfusion related reactions is to transfuse only when appropriate, according to evidence based guidelines.

The Canadian Blood Services (CBS) has implemented strategies to reduce TRALI:

- Hospitals are supplied with plasma from male donors
- Platelets are supplied from either male donors or females that have not been pregnant

These strategies reduce the risk of transfusing plasma containing HLA and/or granulocyte antibodies.

In identified cases of TRALI, donor testing may lead to deferral from future blood donation.

Further CBS tactics to improve overall transfusion safety include:

- Leukoreduction to reduce HLA sensitization and febrile transfusion reactions
- CMV negative and Irradiated blood products to reduce CMV infections and Transfusion Associated Graft versus Host Disease (TA-GVHD) respectively
- Culturing of all platelet products to reduce bacterial sepsis

**NOTE:** At LHSC and St Joseph's, all transfusion reactions should be reported using the Transfusion ReAction Course (TRAC) [http://www.lhsc.on.ca/lab/bldbank/btm/L\\_TRAC.pdf](http://www.lhsc.on.ca/lab/bldbank/btm/L_TRAC.pdf).

<sup>1</sup>Callum JL et al. BloodyEasy3: Blood transfusions, blood alternatives and transfusion reactions a guide to transfusion medicine. 3<sup>rd</sup> ed: 2011.