

A TRANSFUSION-RELATED RESPIRATORY EVENT: ANSWERS

A case history by Jim Perkins, M.D. (© 2009)

1. What is the differential diagnosis for this reaction?

This patient's respiratory failure initially appeared to be due transfusion-associated cardiac overload (TACO) superimposed on multifactorial CHF. However, the relatively small volume of RBCs transfused, the acute nature of the recipient's decompensation, and his post-reaction leukopenia suggest transfusion-related acute lung injury (TRALI). An allergic reaction may also present with respiratory symptoms, but the pulmonary edema revealed by the chest x-ray is not consistent with this. Finally, the possibility that the patient's symptoms are simply coincidental to the transfusion must be considered. Pulmonary embolism is certainly a possibility. A myocardial infarction is probably ruled out by the cardiac marker data.

2. Based on your differential diagnosis is there any other history you would like to obtain, or are there any other tests you would like to do?

In order to evaluate the possibility of TACO a BNP level should be measured on the post-transfusion specimen. Scrutiny of the patient's input and output and serial weights might reveal other evidence of iatrogenic volume overload. The actual volume of the second transfusion delivered is relatively small, but the patient was certainly predisposed to TACO by virtue of his underlying CHF.

The first step in evaluating the possibility of TRALI is to determine whether the donor of the unit had a risk factor for formation of anti-leukocyte antibodies, specifically whether the donor was a gravid woman or previously-transfused man. If such a risk factor is present the donor can be tested for antibodies against HLA and neutrophil antigens.

Had the patient survived a variety of studies could have been done to investigate the possibility of pulmonary embolism, but in this case an autopsy would have been needed to rule it out.

3. What is your diagnosis?

This case was reported to the US-FDA as a transfusion-related death due to TRALI superimposed on pre-existing pulmonary compromise due to longstanding CHF. Definitions of TRALI typically include circulatory overload as an exclusion criterion. Note however that these are surveillance definitions based on clinical criteria alone that are intended to be unbiased with respect to proposed etiologies of TRALI. However, the hypothesis that donor anti-leukocyte antibodies are at least one cause of TRALI is generally accepted, and any of the varieties of antibodies demonstrated in this donor, whether anti-class-I HLA, anti-class-II, or anti-neutrophil, would be accepted as an explanation. The studies, although plagued by the age of the recipient neutrophils, were highly suggestive that these cells had antigens corresponding to the donor antibodies, and the sharp fall in his WBC count virtually confirms this.

4. Given the information you have, do you think this transfusion was indicated?

In the author's opinion transfusion of the first unit of RBCs was questionable, and the second was clearly not indicated. In a randomized controlled trial by Hebert (NEJM, 1999) of RBC transfusion in patients in the ICU those assigned to the restrictive strategy (RBC transfusion initiated at a hemoglobin < 7; hgb maintained between 7 and 9) had a lower 30 day mortality rate than those assigned to the traditional liberal strategy (RBC transfusion initiated at a hemoglobin < 10; hgb maintained between 10 and 12). Of note, pulmonary complications were more common in the liberally transfused group.