MANAGEMENT OF ANTIBODY-MEDIATED TRALI IN CROATIAN INSTITUTE OF TRANSFUSION MEDICINE FROM 2004 TO 2020

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Background

Popovsky and Moore where first described TRALI back in the 80s as a syndrome characterized by acute pulmonary oedema, respiratory distress, hypoxemia, hypotension, and elevated body temperature in connection with a recent transfusion of a plasma blood component. In the hemovigilance systems of many countries, TRALI had been early recognized as one of the most significant serious adverse reactions to blood transfusion treatment, with a frequent fatal outcome. In the Croatian system of monitoring transfusion treatment, TRALI was recognized only about 20 years later, and defined as acute onset (during or within 6 hours of transfusion), hypoxaemia (SpO_2 < 90%), clear evidence of bilateral pulmonary oedema on chest x-ray (Figure 1), no evidence of LAH, and no temporal risk factors for ALI. With this paper, we want to present the management of antibody-mediated TRALI (Figure 2) in Croatian Institute of Transfusion Medicine (CITM) during the 17-year period (2004-2020).

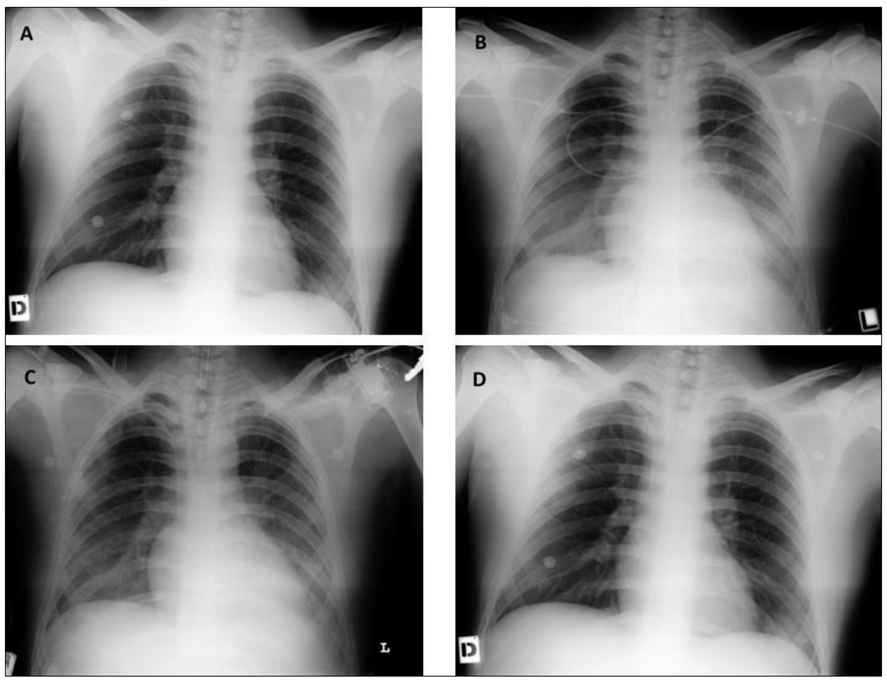

Figure 1. Chest x-ray in antibody-mediated TRALI due to HLA-II in Croatian patient in 2011: A - before transfusion (11/9/2011), B - bilateral pulmonary infiltrates after transfusion (15/9/2011), C - bilateral pulmonary infiltrates after intubation (17/9/2011), D - post-event significant radiological improvement (21/9/2011).

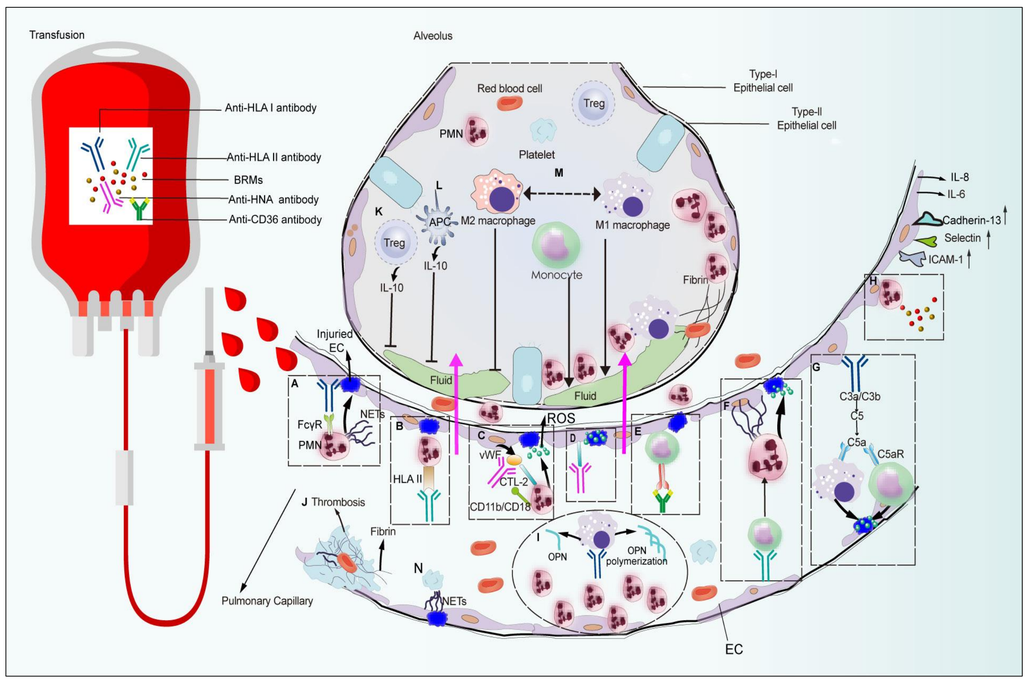

Figure 2. Pulmonary reaction and effector phase of TRALI pathogenesis. (Adopted from: Yu Y and Lian Z (2023) Update on transfusion-related acute lung injury: an overview of its pathogenesis and management. *Front. Immunol.* 14:1175387.)

Methods

From 2004, following methods to reduce the risk of antibody-mediated TRALI were applied at CITM:

1. Minimizing the risk of antibody-mediated TRALI; a male-only plasma policy was adopted in 2004 according to the recommendation of Serious Hazards of Transfusion (SHOT), and since 2006 anti-leukocyte antibodies have been screened in all female apheresis platelet donors.
2. Serological investigation of TRALI cases; since 2008, recommendations of the ISBT Working Party on Granulocyte Immunobiology (ISBT-GWP) have been adopted for the screening of leucocyte antibodies in the investigation and prevention of antibody-mediated TRALI. Since 2013 laboratory investigations of antibody-mediated TRALI were carried out according to the Guidelines for the Blood Transfusion Services in the United Kingdom, 8th edition (Chapters 16 and 17). In case of suspected TRALI, serum samples from female and transfused male blood donors of components implicated in TRALI were tested for the presence of clinically significant anti-HNA, anti-HLA-I and anti-HLA-II antibodies. Testing was performed by granulocyte immunofluorescence test (GIFT), granulocyte agglutination test (GAT), microlymphocytotoxic test (LCT), enzyme immunoassay (EIA) IgG, Lifecodes Quickscreen and B-Screen (Immucor, USA), and qualitative bead-based immunoassay (LifeScreen-LMX, Lifecodes, Immucor, USA). If screening was positive, the monoclonal antibody immobilization of granulocyte antigens (MAIGA) method for determination of the HNA antibodies specificity was done. HNA genotyping of the donors by PCR-SSP method supporting serological investigation was applied.

Results

From 2004 to 2020, 41 cases of suspected TRALI were examined in CITM, of which 12 cases were serologically confirmed as antibody-mediated TRALI. One of them was associated with antibodies to HNA-2, seven with HLA-I and four with HLA-II. There were no reported TRALI cases associated with HNA-3a antibodies. The frequency of suspected TRALI was 18/1.000.000 blood components issued for transfusion treatment, and frequency of confirmed TRALI was 5/1.000.000 respectively (Figure 3).

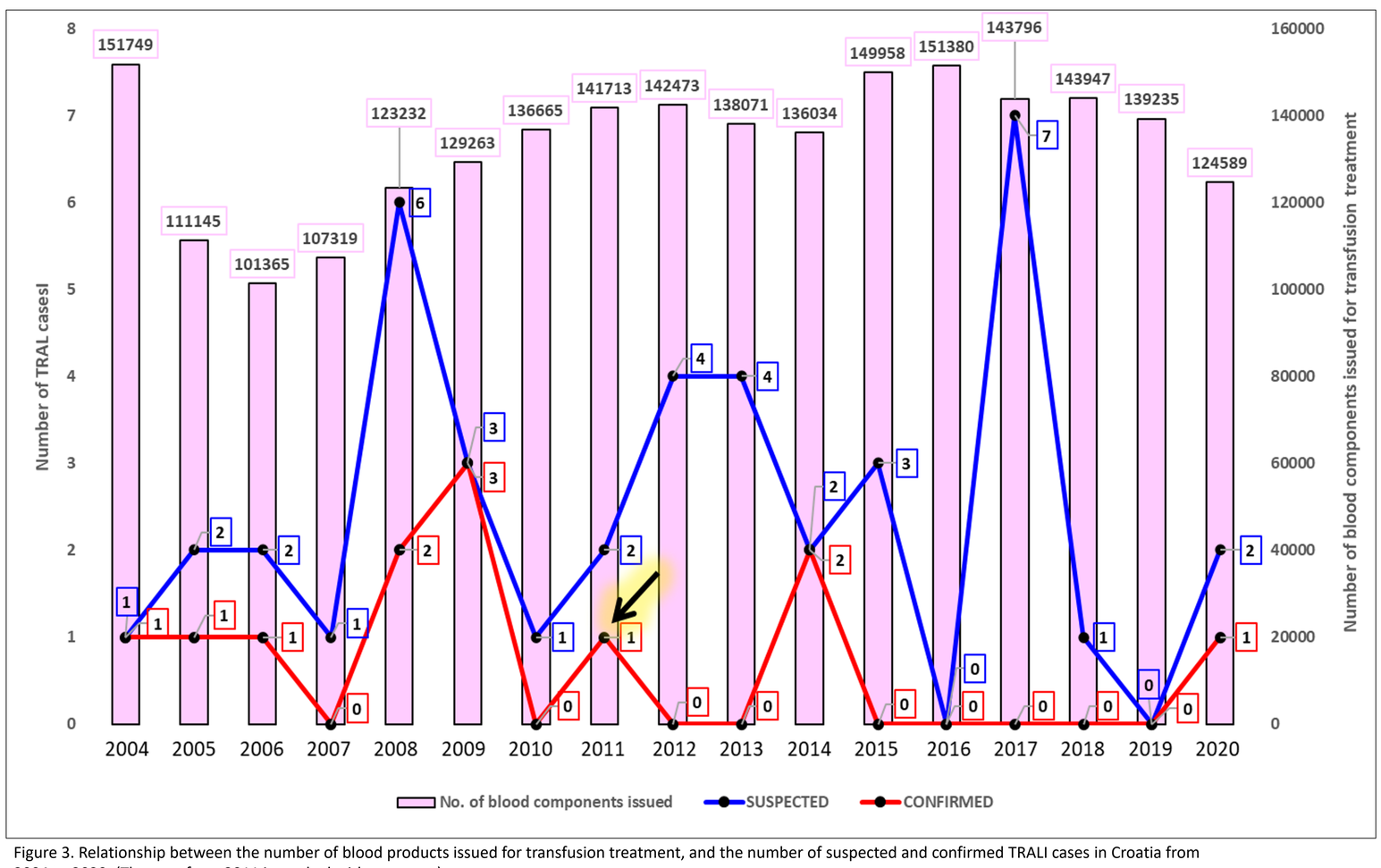

Figure 3. Relationship between the number of blood products issued for transfusion treatment, and the number of suspected and confirmed TRALI cases in Croatia from 2004 to 2020. (The case from 2011 is marked with an arrow.)

Conclusion

Early adoption of a male-only plasma policy and no confirmed TRALI cases associated with HNA-3a antibodies which are particularly important because of the severe or fatal outcomes seen in TRALI cases, was probably the reason why we did not have a single case of severe or fatal TRALI reported through the years. From 2021, CITM adopted an updated TRALI definition (TRALI Delphy panel 2019), which includes identifying the mechanism behind the onset of TRALI in the absence of related leukocyte antibodies. These data will be for some further discussion.