

Transfusion-related acute lung injury in a young woman with ectopic pregnancy – case report and literature review

Ostre poprzetoczeniowe uszkodzenie płuc u młodej kobiety z ciążą ektopową – opis przypadku i przegląd literatury

Krzysztof Jaworski¹, Krystyna Maślanka², Artur Jakimiuk³, Patrycja Łopacz², Paweł Panin¹, Dariusz A. Kosior^{1,4}

¹ Department of Cardiology and Hypertension, Central Clinical Hospital of the Ministry of Interior, 137 Wołoska Street, 02-507 Warsaw, Poland

² Department of Immunohaematology and Immunology of Transfusion Medicine, Institute of Hematology and Transfusion Medicine, 5 Chocimska Street, 00-791 Warsaw, Poland

³ Department of Obstetrics, Female Diseases and Gynecological Oncology, Central Clinical Hospital of the Ministry of Interior, 137 Wołoska Street, 02-507 Warsaw, Poland

⁴ Mossakowski Medical Research Centre, Polish Academy of Sciences, 5 Pawińskiego Street, 02-106 Warsaw, Poland

Abstract

Background: *Transfusion-related acute lung injury (TRALI) is a major cause of death associated with transfusion. Nevertheless it is still misdiagnosed and underreported. We present a case of this serious complication in order to make it more familiar to clinicians and indicate proper medical management, which is significant not only for the patients presenting TRALI symptoms but also for future recipients of blood components.*

Case presentation: *A 32-year-old white woman with in-vitro fertilization in anamnesis was admitted to Department of Obstetrics and Gynecology because of abdominal pain. Ultrasonography examination revealed pathological mass in left adnexa. The patient underwent laparoscopic left salpingectomy. The following day she reported progressive pain in lower abdomen with signs of peritoneal irritation. Emergency laparotomy was performed and active bleeding from fallopian tube was stopped. Four units of red blood cells concentrate and six units of fresh frozen plasma were transfused. Within two hours of surgery acute respiratory distress symptoms occurred, bilateral infiltrates were found on chest X-ray. The patient responded to supportive treatment (oxygen therapy, dexamethasone, diuretics) and her state improved within 12 hours. Serological diagnostics revealed anti-HLA antibodies in one donor which reacted with patient's granulocytes. Clinical picture and anti-leukocyte antibodies detected in blood component allowed to identify the immune-mediated TRALI.*

Conclusions: *Transfusion-related acute lung injury is a life-threatening complication of transfusion which manifests as non-cardiogenic pulmonary edema. Each suspected case of this syndrome should be reported to blood center in order to confirm the diagnosis and implement preventive measures (exclusion of implicated donor from further blood donation).*

Key words: **pulmonary edema / TRALI / acute respiratory failure / transfusion /**

Corresponding author:

Krzysztof Jaworski
Department of Cardiology and Hypertension,
Central Clinical Hospital of the Ministry of Interior, 137 Wołoska Street, 02-507 Warsaw, Poland
tel./fax. +48225081670/+48225081680,
email: krjaworski@wp.pl

Otrzymano: 13.07.2014
Zaakceptowano do druku: 20.01.2015

Krzysztof Jaworski et al. *Transfusion-related acute lung injury in a young woman with ectopic pregnancy – case report and literature review.*

Streszczenie

Cel pracy: Ostre poprzetoczeniowe uszkodzenie płuc (TRALI) jest jedną z głównych przyczyn zgonów związanych z transfuzją składników krwi. Niemniej jednak powikłanie to pozostaje często nierozpoznawane lub niezgłaszane do odpowiednich ośrodków. W niniejszej pracy prezentujemy przypadek tego poważnego powikłania w celu przybliżenia jego obrazu klinicznego i wskazania prawidłowego postępowania, które jest nie tylko istotne dla pacjenta z objawami TRALI, ale także dla przyszłych biorców preparatów krwiopochodnych.

Opis przypadku: 32-letnia kobieta rasy kaukaskiej z wywiadem zapłodnienia pozaustrojowego została przyjęta do Kliniki Położnictwa i Ginekologii z powodu bólu brzucha. Badanie ultrasonograficzne ujawniło obecność patologicznej masy w obrębie lewych przydatków macicy. Pacjentka przebyła lewostronną laparoskopową salpingektomię. Następnego dnia zgłosiła narastające dolegliwości bólowe w podbrzuszu z cechami podrażnienia otrzewnej. Przeprowadzono pilną laparotomię, w trakcie której zatamowano aktywne krwawienie z kikuta jajowodu. Pacjentce przetoczono 6 jednostek koncentratu krwinek czerwonych i 4 jednostki świeżo mrożonego osocza. Po 2 godzinach od operacji wystąpiły objawy ostrej niewydolności oddechowej a w rentgenogramie klatki piersiowej stwierdzono obustronne zaciemnienia. Zastosowano leczenie podtrzymujące: tlenoterapia bierna, deksametazon, diuretyki. Stan pacjentki uległ poprawie w ciągu 12 godzin. Diagnostyka serologiczna ujawniła u jednego dawcy krwi obecność przeciwciał anti-HLA reagujących z granulocytami pacjentki. Obraz kliniczny i przeciwciała antyleukocytarne wykryte w przetoczonym składniku krwi pozwoliły rozpoznać immunologiczną postać TRALI.

Wnioski: Ostre poprzetoczeniowe uszkodzenie płuc jest zagrażającym życiu powikłaniem potransfuzyjnym, które manifestuje się jako niekardiogeny obrzęk płuc. Wszystkie przypadki z objawami wskazującymi na wystąpienie tego zespołu powinny być zgłaszane do Centrów Krwiodawstwa i Krwiolecznictwa celem potwierdzenia diagnozy i wdrożenia odpowiednich środków profilaktycznych (wyłączenie dawcy z przeciwciałami antyleukocytarnymi z dalszego oddawania krwi dla celów klinicznych).

Słowa kluczowe: **obrzęk płuc / TRALI / ostra niewydolność oddechowa / transfuzja /**

Introduction

Transfusion-related acute lung injury (TRALI) is a rare but life-threatening complication of transfusion. Incidence of this syndrome is estimated at approximately 0.02% per unit transfused or 0.16% per recipient [1]. However, the true prevalence remains unknown due to the large number of cases misdiagnosed and unreported to appropriate blood centers. Awareness of the problem and proper medical management is significant not only for the patients presenting TRALI symptoms but also for future recipients of blood components.

Case report

A 32-year-old woman with no previous medical history, except for in vitro fertilization and embryo transfer (IVF-ET), was admitted to the Department of Gynecology and Obstetrics for ectopic pregnancy. At admission the patient complained of abdominal pain. Transvaginal ultrasound examination revealed a pathological mass in left adnexa. Serum β -hCG level was 1963 mIU/L. Laparoscopic left salpingectomy was performed. The following day the patient reported progressive pain in lower abdomen. Physical examination revealed signs of peritoneal irritation, heart rate 110 beats per minute and blood pressure 100/70 mmHg. Free fluid was found in the peritoneal cavity at ultrasound examination, serum hemoglobin concentration decreased to 5.7 g/dL. Emergency laparotomy showed active bleeding from fallopian tube stub and the right epigastric artery at the site where the trocar had been removed. The bleeding was stopped and 1500 mL of blood were evacuated from the abdominal cavity. The patient was transfused four units of red blood cells concentrate (RBC) and six units of fresh frozen plasma (FFP).

Within two hours of surgery patient's condition rapidly deteriorated with symptoms of acute respiratory distress such as dyspnea, tachypnea and tachycardia. Oxygen saturation level decreased to 77%. On physical examination the patient presented attenuation of breath sounds and diffuse crackles in the lungs while blood pressure remained within normal range. Laboratory investigations revealed leukocytosis ($17 \times 10^9/L$) and CRP level elevated up to 75 mg/L. Bilateral infiltrates were found on chest X-ray (Figure 1).

No relevant issues appeared in electrocardiogram and echocardiogram. The clinical picture, temporal relationship to transfusion and no relevant changes in additional tests (apart from elevated inflammation markers most likely due to the surgery or underlying disease) suggested that the case met all TRALI criteria [2]. Oxygen therapy, dexamethasone and diuretics were administered. The patient responded to supportive treatment and her state improved within 12 hours. Serological diagnostics toward immune-mediated TRALI was performed in the patient and archive plasma samples of all blood donors. Anti-HLA antibodies were found only in one red blood cells concentrate donor. Positive cross-match between the patient's granulocytes and this donor's plasma confirmed immune-mediated TRALI.

Discussion

Transfusion-related acute lung injury is a rare but dangerous complication of transfusion. Any blood component that contains plasma may be implicated. Pathophysiology of TRALI is not completely understood. There is strong evidence that at least two mechanisms are responsible for this complication and that allows to identify two forms of the syndrome:

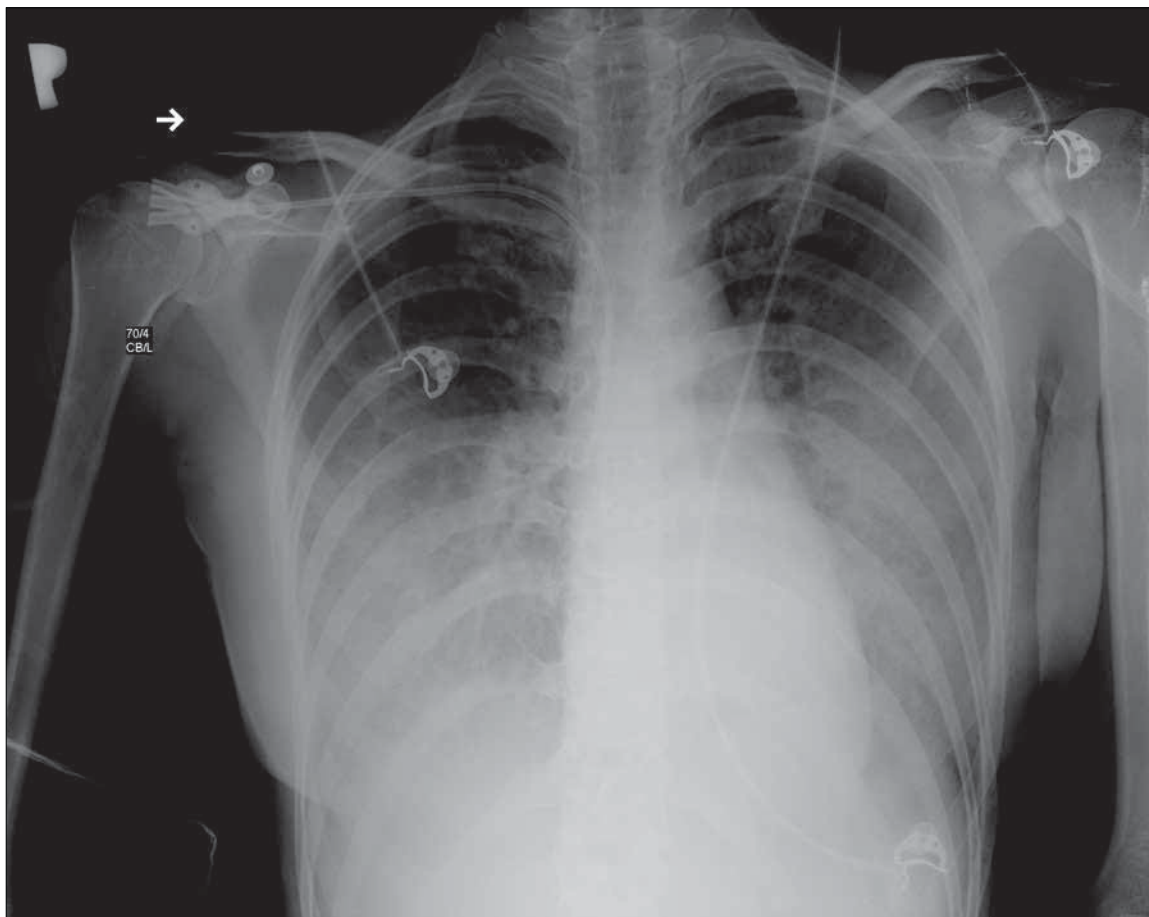
Krzysztof Jaworski et al. *Transfusion-related acute lung injury in a young woman with ectopic pregnancy – case report and literature review.*

Figure 1. Chest x-ray presenting bilateral pulmonary edema.

1. “immune-mediated” TRALI, induced by reaction between anti-HLA and/or anti-HNA antibodies present in the serum of recipient or donor and leukocytes of donor or recipient, respectively.
2. “non-immune-mediated” TRALI, caused by transfusion of biologically active compounds such as bioactive lipids or proinflammatory cytokines that accumulate during storage of blood components [3-5].

The most common symptoms are dyspnea, tachypnea, tachycardia, cyanosis and cough, sometimes with frothy pulmonary secretions from the mouth. Physical examination reveals breath sounds attenuation and diffuse crackles [6]. On chest radiograph TRALI manifests as bilateral infiltrates with normal cardiac silhouette. The current diagnostic criteria established during the American-European Consensus Conference (AECC) in 2004 are presented in Table I [3].

In order to confirm diagnosis each suspected case should be reported to blood transfusion centers for leukocyte antibody screening in recipient’s and donor’s blood.[7,8]. Treatment is symptomatic and based on oxygen therapy. Approximately 70% of patients require mechanical ventilation [3]. The mortality rate for TRALI is about 10%. In most cases the patients’ condition improves over 48-96 hours [2]. Due to limited therapeutic options more attention is paid to prevention. One alternative is to defer from blood donation people who could have been immunized during previous blood transfusions or pregnancy.

Table I. Diagnostic criteria for TRALI.

Transfusion-related acute lung injury
<ol style="list-style-type: none"> 1. Acute lung injury: <ol style="list-style-type: none"> a) Acute onset of symptoms, b) Hypoxemia: $\text{PaO}_2/\text{FiO}_2 < 300$ or $\text{SpO}_2 < 90\%$ (no oxygen) or other clinical signs of hypoxemia, c) Bilateral infiltrates on frontal chest radiograph, d) No evidence of left atrial hypertension. 2. No preexisting acute lung injury before transfusion. 3. Development of symptoms during or within 6 hours after transfusion. 4. No temporal association with alternative risk factors for acute lung injury (foreign body aspiration, pneumonia, inhalation of toxins, burns, drowning, polytrauma, drug overdose, acute pancreatitis, cardiopulmonary bypass).

Krzysztof Jaworski et al. *Transfusion-related acute lung injury in a young woman with ectopic pregnancy – case report and literature review.*

There is no doubt regarding the justification of exclusion from further donation of blood donors whose antibodies were proved to be causally associated with TRALI [3]. The described case was related to transfusion of RBC from a multiparous woman with anti-HLA antibodies. She was immediately deferred from blood donation. A year after this event the patient gave birth to a healthy boy with no complication neither during the pregnancy nor the labor.

Acknowledgments:

We would like to thank Beata Sierocka (Institute of Hematology and Transfusion Medicine in Warsaw) for performing laboratory testing of antileukocyte antibodies. This would not be possible without the kind contribution of Joanna Milewska, Justyna Mazur and Dorota Woźniewska who provided access to samples of transfused blood components archived in blood transfusion centers.

Oświadczenie autorów:

1. Krzysztof Jaworski – author of concept, treatment, literature review, acquisition of data, preparation of the manuscript, corresponding author.
2. Krystyna Maślanka – acquisition of data, performing serological diagnostics, literature review, preparation of the manuscript, revision and final acceptance.
3. Artur Jakimiuk – treatment, literature review, revision and final acceptance.
4. Patrycja Łopacz – performing serological diagnostics, literature review, revision and final acceptance.
5. Paweł Panin – treatment, revision and final acceptance.
6. Dariusz A. Kosior – author of concept, treatment, literature review, revision and final acceptance, corresponding author.

Authors' statement

- This is to certify, that the publication will not violate the copyrights of a third party, as understood according to the Act in the matter of copyright and related rights of 14 February 1994, Official Journal 2006, No. 90, Clause 63, with respect to the text, data, tables and illustrations (graphs, figures, photographs);
- there is no 'conflict of interests' which occurs when the author remains in a financial or personal relationship which unjustly affects his/her actions associated with the publication of the manuscript;
- any possible relationship(s) of the author(s) with the party/parties interested in the publication of the manuscript are revealed in the text of the article;
- the manuscript has not been published in or submitted to any other journal.
- Source of financing: self-financing.

References

1. Swanson K, Dwyre DM, Krochmal J, Raife TJ. Transfusion-related acute lung injury (TRALI): current clinical and pathophysiologic considerations. *Lung*. 2006, 184 (3), 177-185.
2. Kleinman S, Caulfield T, Chan P, [et al.]. Toward an understanding of transfusion related acute lung injury: statement of a consensus panel. *Transfusion*. 2004, 44 (12), 1774-1789.
3. Müller MC, Juffermans NP. Transfusion-related acute lung injury: a preventable syndrome? *Expert Rev Hematol*. 2012, 5 (1), 97-106.
4. Shaz BH, Stowell SR, Hillyer CD. Transfusion-related acute lung injury: from bedside to bench and back. *Blood*. 2011, 117 (5), 1463-1471.
5. Silliman CC, Moore EE, Kelher MR, [et al.]. Identification of lipids that accumulate during the routine storage of prestorage leukoreduced red blood cells and cause acute lung injury. *Transfusion*. 2011, 51 (12), 2549-2554.
6. Silliman CC, Ambruso DR, Boshkov LK. Transfusion-related acute lung injury. *Blood*. 2005, 105 (6), 2266-2273.
7. Bierling P, Bux J, Curtis B, [et al.]. Recommendations of the ISBT Working Party on Granulocyte Immunobiology for leucocyte antibody screening in the investigation and prevention of antibody-mediated transfusion-related acute lung injury. *Vox Sang*. 2009, 96 (3), 266-269.
8. Sayah DM, Looney MR, Toy P. Transfusion reactions: newer concepts on the pathophysiology, incidence, treatment, and prevention of transfusion-related acute lung injury. *Crit Care Clin*. 2012, 28 (3), 363-372.

K O M U N I K A T



Ogólnopolska Interaktywna Konferencja Ginekologiczno-Położnicza

„Jak postępować w trudnych sytuacjach klinicznych?”

19-20 maja 2016 r. Lublin

Tematyka kongresu:

- Live surgery
- Położnictwo
- Uroginekologia
- Onkologia ginekologiczna
- Sesja rezydentów: „Moja największa przygoda dyżurowa”
- Multimedialna sesja plakatowa

Szczegółowe informacje:

www.interaktywnakonferencja.pl

Niższa opłata rejestracyjna do 30.03.2016 r.
– liczba miejsc ograniczona

Serdecznie zapraszam do aktywnego udziału,

Prof. dr hab. Tomasz Rechberger