Transfusion-related Acute Lung Injury in a Case of Ruptured Ectopic Pregnancy

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ABSTRACT

Aim: To highlight an uncommon complication of blood transfusion, which can be detected early based on suspicion, especially when the presentation is mild or atypical.

Background: Transfusion-related acute lung injury (TRALI) is a rare complication of blood transfusion which can be life-threatening. TRALI is most commonly associated with plasma-containing blood products. The transfusion components can be fresh frozen plasma (FFP), whole blood platelet concentrates, and apheresis platelets and packed red blood cells. TRALI is thought to be caused by activation of recipient neutrophils by donor-derived antibodies targeting human leukocyte antigen (HLA).

Case description: We are herewith presenting the case of a 26-year-old lady who was admitted with the diagnosis of ruptured ectopic pregnancy and a hemoglobin of 5.6 g%. Exploratory laparotomy was done, and she received three transfusions intra and postoperatively. After a few hours, we noticed that she was not maintaining SpO₂ at room air. Chest X-ray showed infiltrates, and ECHO was normal. With the diagnosis of TRALI, she was started on nasal oxygen and was investigated. She responded well to injection hydrocortisone and diuretics and recovered within 72 hours.

Conclusion: TRALI is a clinical diagnosis that should be considered in all patients who have respiratory difficulty and pulmonary insufficiency during or after transfusion. Timely recognition and adequate treatment are crucial in its management.

Clinical significance: The classical presentation of TRALI includes onset of dyspnea and tachypnea within 6 hours of a transfusion. TRALI should be differentiated from transfusion-associated circulatory overload (TACO) and other transfusion reactions and also from cardiac conditions and pulmonary embolism. In mild cases, nasal oxygen administration is sufficient to achieve clinical improvement. In severe cases, mechanical ventilation may be necessary. Our patient responded well to hydrocortisone and diuretics and oxygen inhalation at 2 L/minute.

Keywords: Ectopic pregnancy, SpO₂, Transfusion-related acute lung injury, Transfusion reactions.


BACKGROUND

Transfusion-related acute lung injury (TRALI), also known as transfusion-related acute lung injury, is a rare complication of blood transfusion which can be life-threatening. The incidence of TRALI has not been well established because it is often underreported. The current incidence is estimated to be 1 in 5,000 blood products. It is also sometimes misdiagnosed because diagnostic criteria are not very clear. There is no specific laboratory test for diagnosing TRALI.

Transfusion-related acute lung injury is thought to be caused by activation of recipient neutrophils by donor-derived antibodies targeting human leukocyte antigen (HLA). TRALI is more common in persons who are already ill from shock, sepsis, or having organ damage who also had surgery or experienced a great deal of stress from trauma.

Manifestations of TRALI are tachypnea and dyspnea, and it usually presents as sudden onset of respiratory difficulty shortly after transfusion. There is hypoxemia detected by decreased SpO₂, and chest X-ray may show lung infiltrates. The lung injury is mostly transient, with pulmonary function, oxygen levels, and chest X-ray returning to normal within 48–96 hours. However, some patients may have a slower recovery and may remain hypoxic with persistent pulmonary infiltrates for several days. A few cases of TRALI may require ventilatory support. Mortality and morbidity are high in this condition.

Transfusion-related acute lung injury is a syndrome of acute lung injury (ALI) associated with transfusion of blood products. TRALI is most commonly associated with plasma-containing blood products. The transfusion components can be fresh frozen plasma (FFP), whole blood platelet concentrates, and apheresis platelets and packed red blood cells.

Even today, there is no consensus regarding the pathogenesis, clinical, and laboratory diagnosis of TRALI. This case is being reported to make clinicians aware of the condition. This was a case with a very atypical presentation of TRALI. The only indication that made us suspect the diagnosis was that the patient was not maintaining SpO₂ for which she was investigated and treated.

The patient was a 26-year-old female with diagnosis of ruptured ectopic pregnancy with anemia (hemoglobin = 5.6 g%) for which exploratory laparotomy was done. She was transfused with a total of three transfusions of whole blood—intra- and postoperatively. There seems to be a strong relationship between exposure to
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multiple transfusions and development of TRALI. The evidence of this association is shown in a study done by the Canadian Critical Care Trial Group.8

**Case Description**

Mrs XYZ aged 26 years, residing in a nearby area, was admitted to labor ward as emergency case. She complained of pain in abdomen since morning which was severe and spread all over the abdomen. It was a dull aching type of pain. The pain was not radiating and not associated with nausea or vomiting. There was history of giddiness since morning. There was no history of fever or history of similar complaints in the past.

She was married since 7 years and was third gravida with previous two cesarean sections. She had regular menstrual cycles and had history of missed period. She was overdue by 7 days. Urine pregnancy test was done which was positive. Ultrasound scan was done which showed uterus of normal size 7.6 × 4.3 × 3.0 cm with endometrial thickness of 4.8 mm. Both ovaries appeared normal in size, shape, and echo texture. There was an ill-defined irregular heterogeneous and nonvascular structure with surrounding free peritoneal fluid showing low level internal echoes. This was suggestive of hemoperitoneum with organized pelvic hematoma.

On general examination, her general condition appeared moderate, she was afebrile, pulse was 96 minutes, and blood pressure was 110/70 mm Hg. Gross pallor was present, and on auscultation, respiratory system and cardiovascular system were normal. There was guarding, rigidity, and tenderness on per-abdominal examination. On per-speculum examination, cervix and vagina appeared normal. On per-vaginal examination, uterus was of normal size, but there was fullness and tenderness in the right adnexa. Cervical movements were tender.

Investigations—Hemoglobin was 5.6 g%, blood group was B positive, prothrombin time was 26.2, international normalized ratio 1.11, and viral markers and LFT and KFT were normal.

With the diagnosis of ruptured ectopic pregnancy, the patient was taken for emergency exploratory laparotomy. Abdomen was opened by Pfannenstiel incision. Clots of approximately 1,000 mL were removed. There was ruptured tubal ectopic pregnancy on right side. Peritubal adhesions were present; hence, right-sided salpingo-oophorectomy was done. Also, left fimbriectomy was done as per patient’s request for sterilization.

Nineteen hours after the surgery, and 4 hours after the last transfusion, the patient failed to maintain SpO2 levels at room air. SpO2 dropped to 81%, and hence she was started on oxygen at rate of 2 L/min. On examination, she was stable with pulse of 90 minutes and blood pressure of 110/70 mm Hg. She was afebrile and chest was clear on auscultation. Chest X-ray was done which showed bilateral infiltrates (Fig. 1). Hence, the diagnosis of TRALI was suspected. Consultant physician was called for opinion. Echocardiography was done which was normal, which ruled out cardiac causes, and TACO transfusion-associated circulatory overload.

The patient was given injection hydrocortisone 100 mg × 8 hourly and diuretics injection Lasix 40 mg twice daily after which she showed improvement after 72 hours (Fig. 2). She was taken off oxygen and observed closely. Intermittent oxygenation was given before eventually tapering it off. Chest physiotherapy was advised. After this, the patient remained stable. Stitches were removed on eighth postoperative day as she was discharge on 10th postoperative day.

**Discussion**

The classical presentation of TRALI is onset of dyspnea and tachypnea within 6 hours of a transfusion. This may be associated with fever and hypotension. Clinically, respiratory distress may be detected, and pulmonary crackles may be present without signs of congestive heart failure or volume overload. In some of the cases, the lung injury is generally transient, returning to pretransfusion conditions within 48–96 hours. TRALI can be associated with a high morbidity. Also, the mortality reported with TRALI is as high as 20%. Mechanical ventilation may be required in severe cases.9

In our patient, the only indication of something abnormal was that patient was not maintaining SpO2 at room air. She needed oxygen to maintain normal saturation. Patient did not have any crepitation on auscultation, and there was no fever or alterations in vital signs such as increased pulse rate and fall
in blood pressure. Her symptoms developed 19 hours after the exploratory laparotomy and within 6 hours of the last transfusion. She received three transfusions, one intraoperatively and two in postoperative period.

There should be awareness among treating physicians about the condition. Prompt diagnosis and appropriate treatment can save lives. Risk is more with plasma-containing blood products. Use of packed red cells instead of whole blood may reduce the problem to some extent.

No specific treatment exists for this syndrome. Current management of TRALI consists of respiratory and circulatory support based on clinical severity. Oxygen supplementation is required in almost all patients; in mild cases, nasal oxygen administration is sufficient to achieve clinical improvement. In severe cases, mechanical ventilation may be necessary. Our patient responded well to hydrocortisone and diuretics and nasal oxygen inhalation at 2 L/minute.

TRALI should be differentiated from TACO and other transfusion reactions. TACO is associated with cardiac dysfunction and volume overload.10 Also, myocardial infarction, pulmonary embolism, anaphylaxis, and sepsis need to be ruled out.11

**Conclusion**

TRALI is a serious complication occurring after transfusion of blood products. The classical presentation of TRALI includes onset of dyspnea and tachypnea within 6 hours of transfusion. The incidence is high especially in patients who are critically ill. Both the underlying condition of the patient and transfusion factors play a role in the onset of this pathology. TRALI needs to be differentiated from TACO, anaphylactic transfusion reactions, and bacterial contamination of the transfused blood product. TRALI is a clinical diagnosis that should be considered in all patients who have respiratory difficulty and pulmonary insufficiency during or after transfusion. Timely recognition and adequate treatment is crucial in its management.12

**Clinical Significance**

TRALI should be differentiated from transfusion-associated circulatory overload (TACO) and other transfusion reactions and also from cardiac conditions and pulmonary embolism. In mild cases, nasal oxygen administration is sufficient to achieve clinical improvement. In severe cases, mechanical ventilation is usually necessary. Our patient had an atypical presentation, where the diagnosis was suspected on the basis of patient not maintaining SpO2. She responded well to hydrocortisone and diuretics and nasal oxygen administration.

**References**


