Transfusion-Related Acute Lung Injury during Liver Transplant: Case Report

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Introduction

Transfusion-related acute lung injury (TRALI) is defined as noncardiogenic pulmonary edema temporally related to the transfusion of blood products. We present a patient who, while undergoing orthotopic liver transplantation, developed acute pulmonary edema within minutes of administration of fresh frozen plasma (FFP).

Intraoperative Course

A 71-year-old female presented for orthotopic liver transplantation. She was brought to the operating room and underwent unnecessary induction of general anesthesia, vascular access placement, and tracheal intubation. The operative field was noted to have continual bleeding and blood products were administered to improve hemostasis. Within minutes of administration of FFP, copious amounts of pale yellow, frothy fluid filled the endotracheal tube and the patient’s oxygen saturation dropped from 100% to 90%. The patient was placed on 100% O2, intermittent suctioning removed 1L of fluid, and IV furosemide given. Hemodynamics and oxygenation stabilized, the operation was completed without further difficulty, including transfusion of additional blood products.

SICU Course

The patient arrived in the SICU on 100% O2 and 10 of PEEP. Vasopressin and norepinephrine were being administered due to persistent hypotension, likely secondary to large intraoperative volume shifts during the procedure (approximately 7 liters of ascites were drained from her abdomen). Over the next 36 hours, the goal of therapy shifted from volume resuscitation to disease and weaning from mechanical ventilation. By the end of post-op day #2 the patient was on 40% O2 and spontaneously ventilating with CPAP. Prolonged encephalopathy prevented successful extubation and the patient had a tracheostomy placed post-op day #6. She was successfully liberated from mechanical ventilation the next day. The remainder of her hospital course was uneventful and she was discharged to rehab three weeks later. As of this past January, on follow-up in transplant clinic, she is doing well, has a healthy appetite, and is able to participate in the day to day activities of her family life. She has had multiple typos and screeners done and her antibody screen remains persistently negative.

TRALI: Differential Diagnosis

The differential diagnosis of TRALI is a transfusion associated circulatory overload (TACO), left ventricular failure, exacerbation or progression of ALI from another cause, ARDS, sepsis, trauma, smoke inhalation, aspiration pneumonitis or pneumonia. The patient had prior ALI, no active infections, and had not been subject to trauma. Intraoperative TEE demonstrated normal function of the left and right ventricles. TACO was ruled out on the basis of preoperative hypotension, removal of 7 L of ascites, a normal TEE, no changes on EKG, and a temporal relationship with the transfusion of 2 units of FFP.

TRALI: Intraoperative Diagnosis

At left: One of two containers of pulmonary edema suctioned from the patient’s ETT.

<table>
<thead>
<tr>
<th>ABG</th>
<th>Post-Induction</th>
<th>Onset of TRALI</th>
<th>Post-op</th>
</tr>
</thead>
<tbody>
<tr>
<td>FiO2</td>
<td>40%</td>
<td>100%</td>
<td>60%</td>
</tr>
<tr>
<td>pH</td>
<td>7.32</td>
<td>7.11</td>
<td>7.36</td>
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<tr>
<td>PaCO2</td>
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</tr>
<tr>
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<td>129</td>
<td>108</td>
</tr>
<tr>
<td>HCO3</td>
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<td>16.2</td>
<td>20</td>
</tr>
<tr>
<td>O2 sat%</td>
<td>99</td>
<td>98</td>
<td>100</td>
</tr>
</tbody>
</table>

At right: Sequential ABGs obtained intraoperatively and immediately post-op. Induction was at 5:45 AM; transfusion of FFP occurred at 6:45 AM. FiO2 at induction was 40% with 5 of PEEP on volume cycled ventilation. The second ABG is at 08:51 at which time copious amounts of fluid were being removed from the ETT via suction. FiO2 was 100%, PEEP 10. Post-operatively, almost 12 hours later, ventilation, oxygenation, and respiratory mechanics had improved significantly. The patient was on 60% FiO2 with 5 of PEEP.

TRALI: Imaging

At left: Preop CXR demonstrating mild left lower lobe collapse, but otherwise clear lungs.

At right: CXR immediately post-op, showing diffuse bilateral infiltrates consistent with pulmonary edema.