Early Prone Positioning To Treat Transfusion-Related Acute Lung Injury (TRALI)

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BACKGROUND

- TRALI is a clinical syndrome of new acute respiratory distress syndrome (ARDS-bilat. Infiltrates with PaO2/FiO2 <200 mmHg) temporally related to transfusion of products.

- Onset within 6 hours of a transfusion,
- Bilateral infiltrates and hypoxemia.
- No evidence of fluid overload, no pre-existing lung injury.
- If alternative risk factors for ARDS, diagnosis of “possible TRALI”[1]
- No specific laboratory markers of TRALI, but often be confirmed with laboratory detection of anti-human leukocyte antigen (HLA) antibodies or anti-human neutrophil antigen (HNA) from donor blood.
- A transient leukopenia, varying from an 8% to a 30% drop in the leukocyte count, is a highly specific occurrence. [2]

- Prone-positioning has been associated with improvements in patient oxygenation and reduction of ventilator-induced lung injury.
- Recent data suggests that early use of prone positioning in patients with ARDS improves mortality.[3]

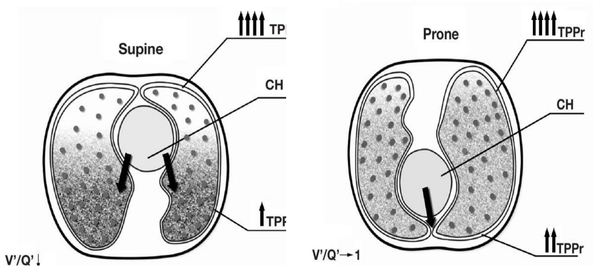

Figure 1:
Prone positioning is thought to improve mortality in ARDS through the recruitment of alveoli, reducing V/Q mismatch. Recent studies have also found that it helps reduce over distension, and preventing ventilator-induced injury.

CASE PRESENTATION

A 39 year-old male with a history of cholangiocarcinoma complicated by biliary stricture for which he underwent stenting was admitted the intensive care unit for septic shock from cholangitis. He was supported with fluids, antibiotics and vasopressors and evaluated by interventional radiology which offered to provide source control with a percutaneous biliary drain. The patient had a developed a mild coagulopathy with an INR 1.7 so at the request of interventional radiology the patient was transfused with three units of fresh frozen plasma prior to the procedure.
Immediately post procedure, the patient became more hypotensive and developed new and profound hypoxia. A chest x-ray revealed the development of new and extensive airspace (Figure 2) disease bilaterally and he required intubation.

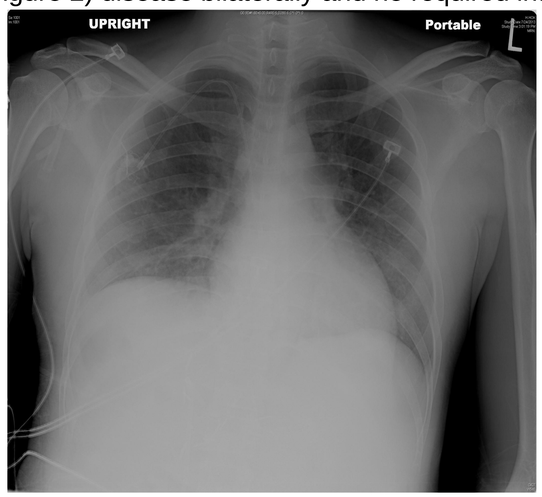

Figure 2A:
Chest radiograph of patient at time of admission. Lung fields are clear with normal vascular markings.

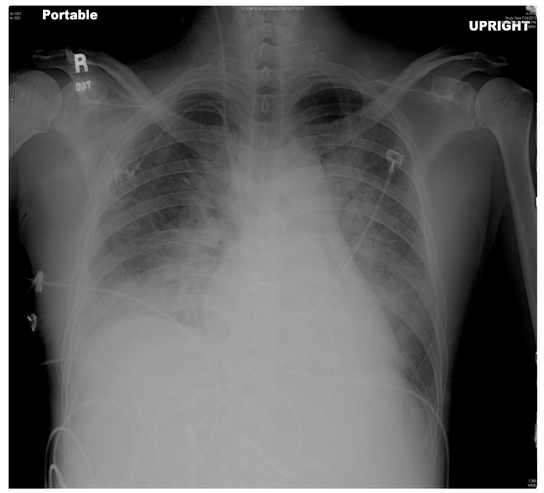

Figure 2B:
Chest radiograph four hours after admission, post-procedure. Note the bilateral patchy infiltrates, evidence of airway disease.

A diagnosis of TRALI was made, supported by a marked drop in white blood cell count (below), a normal echocardiogram and the timing of the decompensation.

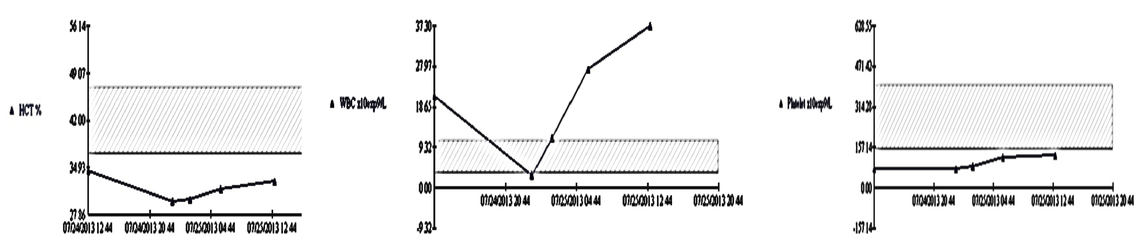

Figure 3:
Hematologic profile of patient before and after transfusion. Initial laboratory data revealed a lactate of 3.6meq/L L (normal reference range 0.3-2.2 meq/L), a white blood cell count (WBC) of 21.1K with 57% bandemia, AST of 436, ALT 185, total bilirubin of 15.3 and INR of 1.8. An echocardiogram was performed which showed an ejection fraction of 50-55% and an estimated right ventricular systolic pressure of 29 mmHg. Of note, the WBC dropped to 2.9 within 8 hours of the transfusion while all other cell lines remained intact, (a highly specific finding in TRALI). Antibody testing of donor plasma was conducted on 2 of the 3 donors. Neither of these 2 donors possessed anti-HLA or anti-HNA antibodies.

OUTCOMES

Patient started on a low tidal volume ventilation strategy, only able to obtain a PO2 of 62 mmHg and oxygen saturation on 100% Fio2 with a PEEP of 18, so the decision to prone the patient was made. He was proned within 16 hours of his development of TRALI and showed immediate improvements in oxygenation and saturation. He received two 16 hour proning sessions over the next 2 days and continued to improve. After day 3 of admission, the patient was able to spontaneously breathe and was extubated. He remained hemodynamically stable and discharged home by day 13.

DISCUSSION

Multiple studies have shown that proning leads to improved oxygenation due to a number of mechanisms, including improved recruitment, V/Q mismatch and decreased lung compression by adjacent tissues. A recent study now suggests a mortality benefit with the early use of prone ventilation in ARDS patients.[3]

Our patient with TRALI and ARDS quickly recovered after he was ventilated in the prone position. Prompt diagnosis of ARDS and a low threshold for the use of prone positioning may improve patient outcome in the intensive care unit.

1. Toy P, Popovsky MA, Abraham E, et al. Transfusion-related acute lung injury: Definition and Review. Crit Care Med. 2005; 33(4): 721-726
2. Marques MB, Tuncer HH, Divers SG, et al. Acute transient leukopenia as a sign of TRALI. Am. J. Hematol. 2005 Sept; 80(1): 90–91.
3. Guerin C, Reignier J, Richard JC et al. Prone Positioning in Severe ARDS. N Engl J Med. 2013; 368(23):2159-68
4. Sayah DM, Looney MR, Toy, P. Transfusion reactions: Newer concepts on the pathophysiology, incidence, treatment and prevention of transfusion related acute lung injury (TRALI). Crit Care Clin. 2012 July; 28(3): 363-372.