

## **Prophylactic Plasma Transfusion for INR Correction Prior to Intervention Radiology Procedure**

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### **Background:**

A 66 year-old African American male presented with a history of intravenous drug use, ethanol abuse, hepatitis C and cirrhosis complicated by hepatocellular carcinoma and underwent a partial hepatectomy. Two months later the patient was admitted with increasing total bilirubin and found to have a complex perihepatic fluid collection requiring drain placement. A peripherally inserted central catheter (PICC) was required for IV therapy. Prior to PICC placement 4 units of plasma were ordered to correct an INR of 2.0 to the interventional radiology (IR) recommended value of 1.5.

### **Clinical observations on day of transfusion:**

The order of plasma transfusion was discussed with the clinical pathology resident who approved 2 units and required a re-evaluation of INR post transfusion. Shortly after transfusion of the second unit of plasma, the patient developed chills and a transfusion reaction workup was ordered. The patient's vital signs were as follows:

- Temperature: increased from 38.1°C to 39.8°C
- Pulse: increased from 91 to 120 bpm
- Blood pressure: increased from 117/55 to 220/70 mmHg.

Of note, the patient was also receiving daptomycin and meropenem during the transfusion and had been febrile the day of and the day preceding his transfusion. The patient's INR corrected to 1.9 after 2 units and an additional 2 units were transfused during the procedure. Shortly after, the patient developed shortness of breath with increased oxygen requirement ultimately requiring endotracheal intubation and mechanical ventilation. The patient was admitted to the surgical intensive care unit (SICU) for sepsis and

transfusion reaction management. The post intubation chest radiograph showed increased interstitial markings bilaterally that suggested worsening pulmonary edema and small left pleural effusion that was also increased from prior chest radiograph. Of note, post transfusion INR was ordered but the procedure was performed prior to the result, which was 1.9.

**Diagnosis:**

The blood bank work up, following this reaction, was completed and it was determined that the patient developed transfusion associated circulatory overload (TACO). The increase in temperature was likely not related to transfusion as the patient has a source of infection and had been febrile prior to the transfusion.

**Follow-up:**

The patient was extubated 3 days later and transferred back to the floor. Unfortunately, later that night the patient required readmission to the ICU with fever and concern for aspiration pneumonia. This resulted in re-intubation, vasopressors and continuous renal replacement therapy. The patients liver function continued to decline with worsening coagulopathy, hyperammonemia, ascites, septic shock and further decline in hemodynamic status. Shortly thereafter, the patient became asystolic requiring CPR, and died later that day.

## Discussion Points

- Clearly, transfusion of 4 units of plasma contributed to this patient's transfusion reactions. Was transfusion of 4 plasma units required in this case?

*The four units of plasma transfused in this case resulted in more harm than benefit.. It is most likely, based on current evidence, that the procedure could have been performed safely with an INR of  $\leq 2.0$ .*

Yates S et al. Transfus 2016; 56: 791; Green L et al. Brit J Haematol 2018; 181: 561

- Would there be any role for vitamin K?

*Studies have shown that IV vitamin K alone is adequate for INR correction within as early as 3 hours, based on the presenting INR. Four factor PCC (e.g., Kcentra) may be a more appropriate treatment in urgent cases and/or in the backdrop of active bleeding.*

Sahai T et al. Transfus 2017; 57: 1885; Polito N et al. Transfus 2019; 59: 1202.

- Could the PICC line placement be safely performed with an INR of 2.0?

*PICC line placement is considered a low risk procedure and the targeted INR of 1.5 in this case exceeds the IR recommended requirement of  $\leq 2.0$ .*

Patel I et al. J Vasc Interv Radiol 2012. 23: 727

- Is INR a good indicator of bleeding risk, especially in patients with liver abnormalities?

*INR primarily reflects factor VII concentration, relevant to the PT, due to its short half-life. It is one of the first procoagulant factors to be low in liver patients. The INR was developed as a means to standardize and manage vitamin K antagonist therapy and not to assess bleeding risk.*

Bryan A et al. Lab Med 2017; 48: 108

- Is there an alternative screening test?

*A screening assay which reflects clot kinetics, such as viscoelastic testing, may be a more appropriate screening test in this case.*

Shin K et al. Ann Lab Med 2017; 37: 204