

Decreasing the Citrate Load to CRRT Patients by Using a Luer Lock to Allow for Lower Blood Flows



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Introduction

Citrate is the preferred anticoagulant for CRRT. Citrate excess results in metabolic alkalosis, while citrate toxicity results in ionized hypocalcemia and metabolic acidosis. One way to mitigate these complications is to decrease the citrate load to the patient. The recommended concentration of citrate in the circuit for anticoagulation is 3-4mmol/L. The lower the blood flow (Qb), the less citrate is needed to maintain this concentration, and therefore less citrate enters the systemic circulation to cause metabolic derangements. Certain CRRT machines, such as the Prismaflex, trigger a "cannot detect return" alarm with Qb ≤ 120ml/min. To mitigate this issue, we placed an extra luer lock on the CRRT return line to increase the resistance in the venous line to allow for a lower Qb. We report our results with the luer lock and Qb 80-100ml/min.

Methods and Materials

We performed a prospective observational study of 17 patients admitted to the Cardio-Pulmonary ICU requiring CVVHDF at the University of Alabama, Birmingham from May 2022 to June 2022. Demographics, clinical and laboratory data were collected. Dialysate flow (Qd), effluent dose, access pressures, alarms, systemic ionized calcium (iCa) and post-filter iCa were monitored. RCA was deployed with Regiocit, which has 18mmol/L of trisodium citrate. Incidences of clotting and citrate excess or toxicity were recorded, as well as any complications from the luer lock.

Results

Median age of the cohort was 64 years. Of the 17 patients, 65% were male, 71% were white. 82.4% of patients had AKI; 17.6% had ESKD. The dialysis catheter was placed in the internal jugular vein in 88.2% and in the femoral vein in 11.8%. Median pre-blood pump citrate rate was 1100ml/h; median effluent dose was 26.14ml/kg/h and the filtration fraction was 27.6%. Median systemic iCa was 1.04-1.28mmol/L; median post-filter iCa was 0.36-0.52mmol/L. 35.2% were on ECMO; CRRT was run in-line with VV ECMO circuit in one patient. Filters were routinely changed every 72h. Four clotting events occurred in total of 3196 CRRT patient-days.

Conclusions

Addition of a luer lock to the CRRT circuit prevented low return pressure alarms on the Prismaflex, allowing for lower blood flows. The potential advantages include decrease in the cumulative amount of citrate delivered to patients, decrease in the total volume of Regiocit solution used, and less frequent nursing changing of bags. Further studies are needed to validate these results.

Demographic and other characteristics	Median/IQR	25 th %ile	75 th %ile
Age (years)	64	58	70
Weight (Kg)	83.6	78.3	132.4
No. of days on CRRT	9	6	17
Pre blood pump (ml/h)	1100	1000	1200
Qd (ml/h)	1100	828	1400
Post filter (ml/h)	200	200	200



Figure 1. Luer Lock.

Demographic and other characteristics	Median/IQR	25 th %ile	75 th %ile
Effluent dose (ml/kg/h)	26.14	22.4	28.7
Filtration fraction (%)	27.6	26.3	28.9
Systemic iCa (mmol/L)	1.18	1.11	1.19
Postfilter iCa (mmol/L)	0.41	0.40	0.45
Platelets (10 ⁹ /L)	91.6	63.4	181.2
INR	1.32	1.22	1.49

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