A SIMPLE TRISODIUM CITRATE PROTOCOL THAT PROVIDES METABOLIC CONTROL AND HIGH SOLUTE CLEARANCE IN CONTINUOUS RENAL REPLACEMENT THERAPY

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Continuous renal replacement therapy (CRRT) is increasingly used to treat critically ill patients with acute renal failure. Its major drawback is the need for anticoagulation. Regional anticoagulation with trisodium citrate is gaining acceptance, but its use has been complicated by the lack of simplified protocols that provide both adequate anticoagulation and metabolic control at higher ultrafiltration rates (higher dialysis dose). A simple protocol using a standardized Bicarbonate-25 dialysate (Na$^+$ 140 meq/L, HCO$_3^-$ 25 mEq/L, K$^+$ 4.0 meq/L), a standardized 0.67% Trisodium Citrate (Na$^+$ 140 meq/L) replacement solution, and a systemic calcium infusion was instituted with the goal of providing adequate anticoagulation and metabolic control at any desired dialysis dose, while decreasing pharmacy labor and risk of error associated with frequent customized solution changes.

Methods: This is a retrospective analysis of the metabolic control achieved using CRRT with the PRISMA machine in 11 critically ill patients who received Bicarbonate-25 dialysate and 0.67% Trisodium Citrate replacement fluid at the University of Alabama since August 2003. Daily records of patient demographics, serum electrolytes, and pH, as well as dialysate parameters and frequency of filter clotting were reviewed.

Results: Mean patient age was 53.6 years; mean weight was 82.3 kg. Patient pH range was 7.34-7.48, with a mean of 7.4. Mean serum bicarbonate was 24.1 meq/L. Dialysate flow rates ranged from 913 ml/hr to 2062 ml/hr (mean 1516 ml/hr) and replacement flow rates ranged from 731 ml/hr to 1509 ml/hr (mean 1048 ml/hr), and were largely determined by desired dialysis dose. Serum ionized calcium levels were in the normal range and post filter ionized calcium levels were all less than 0.4 mmol/L. Ultrafiltration rates ranged from 20 to 51.4 ml/kg/hr (mean 34.2 ml/kg/hr). There were nine episodes of filter clotting for 108 CRRT days.

Conclusions: These solutions allow for excellent metabolic control in patients requiring CRRT, obviating the need for varied customized solutions and complicated protocols. The use of 0.67% Trisodium Citrate as both the anticoagulant and replacement fluid simplifies the system and provides convective clearance. This protocol offers a significant step forward for CRRT in terms of being safe, simple, and effective.