HIGH CITRATE DIALYSATE IS SAFE AND PERMITS HEPARIN FREE CHRONIC HEMODIALYSIS (HD)

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BACKGROUND:

- Citrate dialysate (CD) is a bicarbonate dialysate acidified using 2.4 mEq/L of citrate.
- CD has been shown to increase delivered dose (Kt/Vurea) of dialysis.
- CD is often used for heparin free acute dialyses.
- The above suggest that CD prevents clotting of dialyzers and dialysis system.
- However, clotting of the system is still encountered in some treatments.
- It is proposed that using a higher citrate concentration (4.0 mEq/L, "CD 4.0") would be more effective in permitting heparin reduction.
- The study evaluated:
  - The safety of CD 4.0, by clinical observations and monitoring ionized Ca, total Ca and Mg.
  - The efficacy of CD 4.0 by:
    - The dose of dialysis (Kt/Vurea and URR).
    - The ability to successfully reduce heparin.

PATIENTS & METHODS:

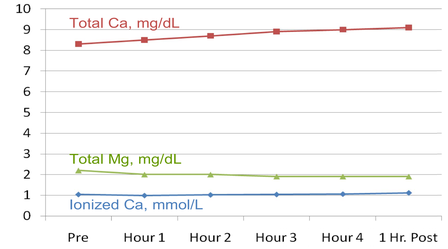
10 chronic HD patients dialyzing 3 times a week consented to participate. The study involved four experimental dialyses:

1. Regular dialysate and heparin (5167 u).
2. CD 4.0 and regular heparin dose.
3. CD 4.0 dialysate and 1/2 heparin dose (2894 u).
4. CD 4.0 dialysate and heparin free (0 u).

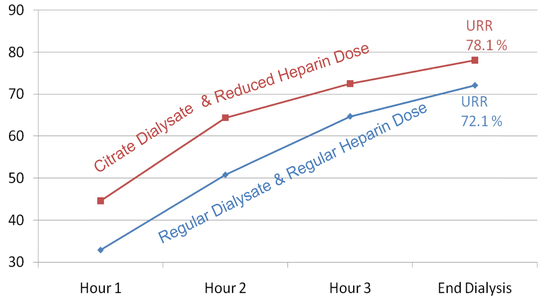
- Hourly measurements of ionized (iCa), total Ca (tCa) , urea, Mg, and other electrolytes were taken at the participants bedside.
- The dialysis circuits and dialyzers were observed for any clotting as well as the line pressures were also continuously monitored

Hourly Total Calcium, Magnesium and Ionized Calcium

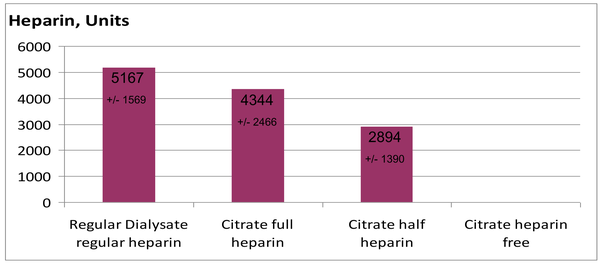
(Normal Reference Ranges: Total Calcium 8.5 to 10.5 mg/dl, Magnesium 1.6 to 2.5 mg/dl and Ionized Calcium 1.18 to 1.32 mmol/L)



URR by Hour with Regular Dialysate and Citrate Dialysate

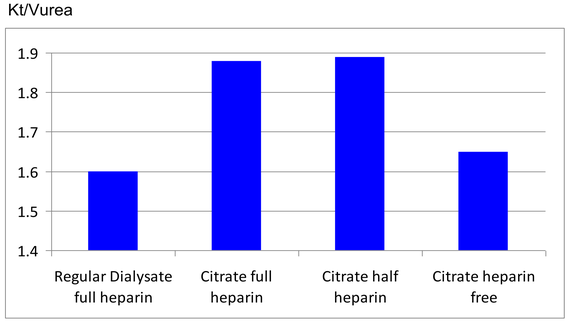


Heparin Dose per Dialysis



NOTE: The average " full " heparin used in the first citrate dialysate treatment is reduced because two patients were treated heparin free for medical reasons.

Dialysis Dose (Kt/Vurea)



RESULTS:

- All dialyses with CD 4.0 were without any complications; patients tolerated each treatment well.
- The dialyzers and tubing sets did not show excessive clotting.
- Two of 10 heparin free treatments were terminated early due to line pressure alarms - both in the final 30 minutes of the treatment.
- No patient had any symptoms of hypocalcemia or hypomagnesemia.
- The dialysis dose did not decrease from baseline either during heparin reduced or heparin free dialysis.

SUMMARY & CONCLUSIONS:

- Higher citrate dialysate (CD 4.0) was well tolerated without any complications.
- CD 4.0 did not significantly reduce ionized or total Ca and was found to be safe for chronic dialysis.
- CD 4.0 permitted successful completion of dialysis treatments with a 50% reduction in heparin.
- The dose of dialysis with CD 4.0 increased significantly even with 50% reduction in heparin.
- 80% of the heparin free dialyses were successfully completed with CD 4.0 use.
  - The two partially completed treatments both had higher Kt/V results than their baseline.
- This first study in chronic HD patients shows that higher citrate dialysate (CD 4.0) is safe to use, is effective in permitting heparin reduction and, was associated with a higher dose of dialysis.