

COMPARISON OF REGIONAL CITRATE ANTICOAGULATION IN HEMODIALYSIS AND ONLINE HEMODIAFILTRATION IN CHRONIC DIALYSIS PATIENTS

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Objectives:

We compared the application of citrate anticoagulation in bicarbonate hemodialysis (BHD) and online pre- and postdilution hemodiafiltration (preHDF and postHDF) in chronic dialysis patients with increased risk of bleeding. The aim of our study was to show that citrate anticoagulation is as safe and efficient in HDF as it is in BHD.

Methods:

DESIGN: retrospective observational study
 PROCEDURES: total 145, of those 68 intermittent BHD, 29 online predilution HDF and 48 online postdilution HDF
 PATIENTS: 15 chronic dialysis patients at risk of bleeding, 9 male and 6 female, 65.5±15 years old
 ANTICOAGULATION: 15% trisodium citrate with starting infusion rate 40-50 ml/h, calcium substitution with 1 mmol/l calcium chloride (CaCl₂) starting infusion rate 13 ml/h, adjustment of citrate infusion rate to achieve target postdialyzer ionized calcium (iCa) and adjustment of calcium infusion rate to achieve target systemic iCa. Calcium-free dialysate / infusate with reduced bicarbonate (28 mmol/l) was used.
 BLOOD SAMPLES: Systemic iCa was checked every hour during the procedure (target above 0.9 mmol/l). The sodium and blood gas analysis were checked before and after the procedure.
 ASSESSMENT OF ANTICOAGULATION: - postdialyzer iCa (target range 0.2 - 0.4 mmol/l)
 - visually after the procedure at dialyzer and both bubble traps on a 1 (total clotting) to 5 (no clotting) scale.

Results:

	BHD	preHDF	p value	postHDF	p value	preHDF vs. postHDF
Blood flow (ml/min)	247±28	281±40	p <0.001	296±15	p <0.001	p < 0.05
15% citrate infusion rate (ml/h)	47±5	46±7	p = NS	45±8	p = NS	p = NS
CaCl ₂ infusion rate (ml/h)	14±2	16±2	p <0.05	16±2.6	p <0.05	p = NS

Table 1: Comparison of mean blood flow, citrate and calcium infusion rate between HD and HDF procedures.

	BHD	preHDF	p value	postHDF	p value	preHDF vs. postHDF
Systemic iCa (mmol/l)	1.06±0.07	1.04±0.07	p = NS	1.06±0.09	p = NS	p = NS
Sodium (mmol/l)	139.7±4.8	138±3.5	p = NS	140±3.8	p = NS	p = NS
pH	7.4±0.05	7.47±0.07	p <0.001	7.45±0.04	p <0.001	p = NS
HCO ₃ (mmol/l)	26.6±2.4	25.3±2	p <0.05	24.4±2	p <0.001	p = NS

Table 2: Average systemic iCa during procedures and sodium, pH and bicarbonate after the procedures to evaluate **safety** of citrate anticoagulation in HD and HDF.

	BHD	preHDF	p value	postHDF	p value	preHDF vs. postHDF
Postdialyzer iCa (mmol/l)	0.28±0.04	0.32±0.05	p = NS	0.3±0.04	p = NS	p = NS
Visual score at dialyzer and bubble traps (median (interquartile range))	5 (4-5)	5 (4-5)		5 (4-5)		

Table 3: Average postdialyzer iCa and visual assessment score of extracorporeal system to evaluate **anticoagulation efficacy**.

Conclusions:

Although HDF is widely considered as the optimal dialysis method in maintenance dialysis patients and regional citrate anticoagulation is recommended in patients with high bleeding risk, there are few reports on citrate anticoagulation in HDF. Mostly patients are switched from HDF to BHD when citrate anticoagulation is performed. In this retrospective analysis we have shown that regional citrate anticoagulation using 15% citrate and calcium-free dialysate is feasible in HDF as well as in BHD in chronic dialysis patients and provides similarly good antithrombotic effect and safety (no metabolic alkalosis, hypernatremia, hypocalcemia). However, more calcium has to be substituted in HDF, but acidosis is better corrected, probably due to the effect of infusate.

References:

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