FRESENIUS MEDICAL CARE

Optimization of ultrapure water consumption in the context of Green Hemodialysis

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Background

The prevalence of chronic kidney disease (CKD) continues rising in the worldwide with an increase of patients requiring renal replacement therapy by hemodialysis. Nowadays. online hemodiafiltration (OL-HDF) provides the most efficient form of dialysis treatment but with high demand in resources associated such as water and electricity. The 5008 therapeutic system (5008TS) has a Qd autoflow sensor allowing an adjustable Qd/Qb ratio in order to optimize the dialysate consumption.

The primary outcome was to evaluate the effects of optimization of the ultrapure water use on clearance adequacy in patients on OLHDF// High-flux dialysis treatment.

Methods

A quasi-experimental single-centre longitudinal retrospective study ("before and after intervention study") conducted between November 2016 and October 2017 (11 months). Sixty-two hemodialysis patients were included from our facility. 39 men and 23 women. mean age: 69 years (we excluded the following patients: 10 patients who had bad vascular access and 8 patients who were transplanted). CKD etiology was: vascular nephropathy (35%). polycystic disease & urological causes (30 %). diabetic nephropathy (19%). chronic glomerulonephritis (10%). and unknown etiology (6 %). Patients were dialysed by arteriovenous fistula (40). tunneled catheter (20) and polytetrafluoroethylene prosthesis (2).

Each patient received three dialysis sessions per week (79 % post-dilution OL-HDF and 21 % High-flux dialysis treatment) and these dialytic parameters were kept constant in all sessions studied: dialysis time (243.37 ± 1.16 min) ; dialyzer (79 % FXCordiax 600. 21 % FXCordiax 600) and Cordiax 5008TS. The 5008TS has a Qd autoflow system with an adjustable Qd/Qb ratio and monitoring Kt/V and convective volume. The initial default setting recommended by the monitor for AutoFLow Qd/Qb ratio was 1.2: this recommendation has been changed to a factor of 1.0 if Qb is equal to or greater than 400 mL/min. or 1.2 if Qb is less than 400mL/min. After two hours in hemodialysis session. we performed this procedure: 1)Post-dilution OL-HDF (Qb > 400 ml/min): if convective volume was greater than 28 L. we decreased Qb to 400 ml/min. If Kt/V was greater than 1.8. we stopped Qd autoflow system and decreased Qd to 400 ml/min. 2) High-flux dialysis (Qb > 400 ml/min): If Kt/V was greater than 1.8 . we stopped Qd autoflow system and decreased Qd to 400 ml/min. 3) Post-dilution OL-HDF// High-flux dialysis (Qb ≤ 400 ml/min): If Kt/V was greater than 1.8. we stopped Qd autoflow system and decreased Qd to 400 ml/min.

The Student's t-test was used for paired data (a P-value < 0.05 was considered statistically significant). SPSS version 20.0

Paired Samples				
	No Intervention	Intervention	P	Δ
N	62	62		
Dialysate volume	137.8 ± 12.01	123.35 ± 9.1	0.000	-14.450
Dialysate volume (solo flow)	118.48 ± 11.49	103.31 ± 7.6	0.000	-15.170
Ratio Flow	1.18 ± 0.21	1.03 ± 0.11	0.000	-0.150
Kt/V (OCM)	1.99 ± 0.39	2.04 ± 0.4	0.054	0.050
Effective treatment time	242.9 ± 1.12	243.37 ± 1.16	0.010	0.470
Kt/V (% Patients>1.4)	0.94 ± 0.16	0.97 ± 0.13	0.022	0.030

Results

All dialysis sessions were carried out with no clinical relevant incidents. There were no differences in dialysis time. convective volume (>23L) and Kt/V (> 1.4) between the two periods of study. A decreased of dialysate volume per session was observed: from 137.8 ± 12.01 L to 123.35 ± 9.1 L (P < 0.05). between the two periods of study

Conclusion

This intradialysis procedure allows us to optimize ultrapure water consumption without negative (effects on clearance adequacy in patients on OLHDF// High-flux dialysis treatment. It seems an excellent way to maintain the sustainability and quality in hemodialysis.

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