REMOVAL EFFICIENCY COMPARISSON BETWEEN ACETATE AND CITRATE BASED DIALYZATE IN ONLINE HEMODIAFILTRATION AND EXPANDED HEMODIALYSIS.

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Introduction

Hemodialysis treatment with bicarbonate dialyzate requires an acidic solution to prevent salt precipitation. Acetic (AC) or citric acid (CT) based dialyzate is preferred according to the treatment modality. The former is implemented in intermittent hemodialysis whereas the latter is relegated to continuous treatments for its calcium chelating properties, enhancing anticoagulation. In addition, CT dialyzate is related to clinical benefits [1] by reducing hyperacetatemia and also showed reduced membrane adsorption of proteins [2], allowing improved removal efficiency. The effect of dialyzate composition together with the enlarged pore size of medium cut-off membranes used in expanded hemodialysis (HDx) on the removal properties have been scarcely explored [3]. Here we compare the removal outcomes between AC and CT dialysate in online hemodiafiltration (HDF) and HDx treatments.

Methods

12 clinically stable chronic patients in hemodialysis underwent their mid-three-weekly-scheduled treatment using Fx-80 Cordiax, Solacea-19 and Theranova-400 dialyzers combined with Fresenius smartbag 211,50 AC or CT-based dialyzate (6 treatments per patient) in a FMC 5008 device. Session parameters such as blood, dialyzate and substitution flow, as well as ultrafiltration rate, total ultrafiltration, transmembrane pressure (TMP), convective volume (CV), blood processed, treatment duration, initial and final hematocrit and hemoglobin, urea dialysance (K), Kt and Kt/V were recorded. Additionally, treatment pre (C_{pre}) and post (C_{post}) blood samples were taken to calculate the reduction ratio, RR(%), of BUN, β_2-microglobulin, albumin and total proteins (TP) by Equation (1), being C_{post} corrected for all molecules except BUN by Bergström&Wehle [4]. Data was compared by ANOVA for repetitive data and Bonferroni posthoc test.

$$RR(\%) = \frac{C_{pre} - C_{post}}{C_{pre}} \cdot 100 \qquad (1)$$

Results

Statistical differences were found for TMP, CV and substitution flow when comparing HDF to HDx treatments ($p<0,01$) but were not translated into significant outcomes for K ($p=0,370$), Kt ($p=0,457$) and Kt/V ($p=0,504$). Regarding removal efficiency, no significance was found in the RR for BUN ($p=0,542$), albumin ($p=0,717$) and total proteins ($p=0,932$) between hemodialyzers and dialyzates (Table 1). In the case of β_2-microglobulin, differences were found between Fx-80 CT and both Theranova-400 AC and CT treatments ($p<0,05$), but not between AC and CT for the same hemodialyzer.

Filter	Dzte.	BUN	β_2-micro	Alb	TP
Fx-80	AC	81±5	80±6	7±7	9±8
	CT	80±5	82±5	9±6	9±6
Sol-19	AC	82±9	79±8	9±7	9±7
	CT	82±5	80±5	9±6	9±6
Ther.	AC	80±7	76±6*	9±6	9±6
	CT	81±3	77±5*	11±10	10±8

*Table 1: Mean± SD values of RR(%) for the different performed treatments. * $p<0,05$ vs. Fx-80 CT.*

Discussion

HDF and HDx treatments with CT dialyzate proved well tolerated and have similar removal outcomes as compared to AC. Our results support the implementation of CT in stable patients undergoing intermittent hemodialysis. However, further studies are needed to analyze the adsorption properties of hemodialyzers under CT dialyzate.

References

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