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The Effect of Treatment Parameters on Achieving High Convective Volume in Post-dilution Online Hemodiafiltration

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Objectives: The aim of this study was to evaluate the effect of treatment parameters on convective volumes in post-dilution online hemodiafiltration (HDF) and to identify a method to achieve high convective volumes in post-dilution online HDF in routine clinical practice.

Methods: In the present study, the effect of treatment parameters on convective volumes were analysed in 32 consecutive HDF patients in our hospital who began post-dilution online HDF therapy between 2014 and 2017. We modified the treatment parameters step by step to achieve a higher convective volume in the following order: (1) adoption of auto-substitution system, (2) treatment time, (3) blood flow rate, (4) needle. The treatment parameters used in the analysis were treatment time, blood flow rate, size of needle, use of the auto-substitution system, and dialyzer.

Results: The mean age of the patients was 61.6±14.5 years, and 43.7% were male. The mean convective volume was 19.9±3.2L per treatment before stepwise modification. After stepwise modification, the convective volume increased to 23.8±2.0L by 16.3% and high convective volume (>22L per treatment) was achieved in 84.3% of patients. When the auto-substitution system is adopted, the convective volume is increased by about 27.1% ($p<0.05$). The convective volume increased about 7.2% when the treatment time increased from 3 hours 30 minutes to 4 hours ($p<0.05$). Increasing blood flow rate from 270 ml/min to 300 ml/min increased convective volume by 9.6% ($p<0.05$). Changing the needle from 16G to 15G increased the convective volume by 7.8% ($p<0.05$). [Table 1].

Conclusions: High convective volumes could be achieved by stepwise modification of treatment parameters such as the treatment time, blood flow rate and needle size in each individual. In addition, a significant increase in convective volume was observed after the adoption of auto-substitution system.

Tab-1. The effects of treatment parameters on convective volume in post-dilution online HDF.

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Parameters	Convective volume (L per treatment)		Increased % of convective volume	*p*
	Before modification	After modification		
Auto-substitution system (Non-use → Use)	14.8±1.7	20.3±2.2	27.1%	*<0.05*
Treatment time (3hr 30min → 4hr)	22.2±0.8	24.0±0.5	7.2%	*<0.05*
Blood flow rate (270mL/min → 300mL/min)	21.3±0.7	23.5±1.4	9.6%	*<0.05*
Needle size (16G → 15G)	23.8±1.7	25.8±2.6	7.8%	*<0.05*