On-line hemodiafiltration and high-flux hemodialysis: comparison of efficiency and cost analysis

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With on-line hemodiafiltration (HDF), low molecular weight substances are predominantly cleared by diffusion while middle molecules such as β2-microglobulin (β2M), an amyloidogenic factor, are removed mainly by convection. The objectives of this study are to evaluate the cost-effectiveness and safety of on-line HDF with dialyzer reuse, and to compare HDF and high-flux hemodialysis (HD) with respect to β2M removal, urea kinetics (Kt/V) and symptom relief in those patients having dialysis-related amyloidosis. Ten chronic HD patients were put on post-dilution HDF for a period of 14.2 ±7.1 months. The AK 100 ULTRA system was used for on-line preparation of substitution fluid. These patients were then switched over to high-flux HD for a period of 4.6 ±3 months. Dialyzers were reused up to 30 times to reduce the cost of HDF. All the patients were hemodynamically stable during both HDF and high-flux HD treatments. No febrile reactions were reported. The percentage reduction of β2M during HDF was significantly higher when compared with high-flux HD (75 ±4% vs 51 ±4%, p < 0.001). After 14.2 ±7.1 months of HDF, the patients had significant reduction of both the pre-dialysis β2M level (47.4 ±7.9 µg/mL vs 28.2 β2.9 µg/mL, p < 0.01) and post-dialysis β2M level (11.4 ±2.8 µg/mL vs 6.8 ±1.0 µg/mL, p < 0.01). eKt/V achieved by HDF was significantly higher than that achieved by high-flux HD (1.94 ±0.26 vs 1.75 ±0.23, p < 0.01). Those patients with dialysis arthropathy and carpal tunnel syndrome had decreased joint pain and hand numbness respectively after putting on HDF but symptoms recurred while on high-flux HD. There were no statistical significant differences in the percentage reduction of β2M, β2M clearance, urea clearance and eKt/V with dialyzer reuse, and no adverse patient reactions had been recorded.

Conclusions: On-line HDF has been proven to be a safe and reliable treatment. The clearance of β2M and urea are significantly increased by HDF when compared with high-flux HD, and the increase in clearance of β2M is sustained throughout the HDF treatment period. Symptoms of dialysis-related amyloidosis are improved by HDF. Dialyzer reuse, which reduces the cost of HDF by 30%, is feasible and safe. (Hong Kong J Nephrol 2001;3(1):21-26)

Key words: β2-microglobulin (β2M), Hemodiafiltration (HDF), High-flux hemodialysis (HD), Kt/V