Continuous venovenous hemodiafiltration and intermittent hemodialysis did not differ for improving survival in ARF and multiorgan dysfunction

Vinsonneau C, Camus C, Combes A, et al; Hemodiafe Study Group. **Continuous venovenous haemodiafiltration versus intermittent haemodialysis for acute renal failure in patients with multiple-organ dysfunction syndrome: a multicentre randomised trial.** Lancet. 2006;368:379-85.

Clinical impact ratings: Hospitalists ★★★★★★☆ Critical Care ★★★★★★☆ Nephrology ★★★★★★☆

QUESTION

In patients with acute renal failure (ARF) as part of the multiple-organ dysfunction syndrome, how do continuous venovenous hemodiafiltration (CVVHDF) and intermittent hemodialysis (IHD) compare for survival?

METHODS

Design: Randomized controlled trial.
Allocation: Concealed.*
Blinding: Blinded (outcome assessors).*
Follow-up period: Up to 90 days.
Setting: 21 intensive care units (ICUs) in university or community hospitals in France.
Patients: 360 patients (mean age 65 y, 73% men) who had ARF, the multiple-organ dysfunction syndrome, and need for renal-replacement therapy. Exclusion criteria included chronic renal failure, ARF of obstructive or vascular origin, continuing treatment with an angiotensin-converting enzyme inhibitor, coagulation disorders, uncontrolled hemorrhage, simplified acute physiology score II ≤ 37, moribund state, and survival expectancy < 8 days.
Intervention: CVVDHF (n = 176) or IHD (n = 184). In CVVDHF, the metabolic objective was to maintain the urea level < 30 mmol/L. The recommended initial settings were blood flow ≥ 120 mL/min, dialysate flow ≥ 500 mL/h, and ultrafiltration flow ≥ 1000 mL/h. A change of membrane every 48 hours was also recommended. In IHD, the objective was a urea reduction ratio > 65% for each session. The recommended initial settings were blood flow ≥ 250 mL/min and dialysate flow ≥ 500 mL/h. Also recommended were a high sodium level (150 mmol/L) and a low temperature (35 °C). All patients received unfractionated or low-molecular-weight heparin.
Outcomes: 60-day survival. Secondary outcomes included 28- and 90-day survival, ICU and hospital lengths of stay, duration of extrarenal support, and adverse events.
Patient follow-up: 99.7% (intention-to-treat analysis).

MAIN RESULTS

The CVVDHF and IHD groups did not differ for 60-day survival (Table). Groups did not differ for 28- or 90-day survival, length of ICU or hospital stay, or duration of extrarenal support (Table). Groups also did not differ for adverse effects, except that CVVDHF prompted more hypothermia events.

CONCLUSION

In patients with acute renal failure as part of the multiple-organ dysfunction syndrome, continuous venovenous hemodiafiltration did not differ from intermittent hemodialysis for improving survival.

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*See Glossary.

Continuous venovenous hemodiafiltration vs intermittent hemodialysis in acute renal failure as part of the multiple-organ dysfunction syndrome†

Outcomes at up to 90 d	Continuous venovenous hemodiafiltration (95% CI)	Intermittent hemodialysis (CI)	*P* value
60-d survival	33% (26 to 40)	32% (25 to 38)	0.98
28-d survival	39% (32 to 46)	42% (35 to 49)	0.65
90-d survival	29% (22 to 35)	27% (21 to 34)	0.95
Renal support duration (d)	11 (8 to 14)	11 (8 to 13)	0.84
Length of ICU stay (d)	19 (15 to 22)	20 (16 to 23)	0.73
Length of hospital stay (d)	32 (22 to 42)	30 (24 to 35)	0.66

†ICU = intensive care unit. CI defined in Glossary.

COMMENTARY

CVVHDF offers more gradual fluid removal than IHD, a feature that theoretically might improve hemodynamic stability, but the cost of CVVHDF is much higher. The well-designed trial by Vinsonneau and colleagues is notable for several reasons. First, CVVHDF did not lead to a significant reduction in any of the clinical outcomes studied, including number of days on dialysis or in hospital, or mortality at 90 days. Although not statistically powered to conclusively exclude a clinically relevant benefit, this trial is the largest and one of the best quality to examine this issue. Its findings add to a body of evidence indicating that the dialysis modality alone is unlikely to influence outcomes in this patient population. Supporters of CVVHDF cite such characteristics as enhanced cytokine removal, but the clinical significance of this theoretical advantage remains unknown.

Second, Vinsonneau and colleagues showed that it was unusual for unstable hemodynamic status to preclude IHD, despite commonly held clinical opinion to the contrary. Although patients with contraindications to systemic anticoagulation were excluded, it was difficult to conceive of a particular benefit that CVVHDF might have in this population that would have changed the findings. The results therefore seem broadly generalizable to critically ill patients with ARF.

Third, the study showed that the optimal treatment of ARF in critically ill patients remains unknown, since this condition is still associated with high mortality despite improvements in dialysis technology.

Some limitations included lack of data on the delivered dose of dialysis and lack of standardization of the duration and frequency of IHD. However, these decisions probably biased results in favor of CVVHDF, reinforcing confidence in the conclusions.

Although CVVHDF may represent a more convenient method for renal replacement therapy in critically ill patients, its potential advantage must be weighed against its substantially higher cost and the lack of proven added clinical benefit.

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