Efficacy of Convection-based Hemodiafiltration Compare with Diffusion-based Hemodialysis in Sepsis-associated Acute Kidney Injury: A Randomized Controlled Trial

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Introduction

Sepsis-associated acute kidney injury (SA-AKI) is a frequent complication in critically ill patients which associated with higher morbidity and mortality. There are many inflammatory cytokines released during sepsis eg. IL-6 and CRP which higher levels believed to be predictors and associated with poorer outcomes.

Methods

SA-AKI patients were randomized into 2 groups for online hemodiafiltration (OL-HDF) and low-flux intermittent hemodialysis (Low-flux IHD). Treatment time was 4 hours and blood flow rate was 200 ml/min for both groups. In OL-HDF group 40 L/session of substitution fluid was added in predilution

The primary outcome is a percentage reduction of IL-6 and CRP at 4 and 48 hours after the first dialysis session. Thirty-day mortality and kidney recovery are our secondary outcomes.

Results

A total of 14 patients with SA-AKI requiring dialysis, female 57.14%, mean age of 67.86 ± 16.21 years old, hypertension 64.29%, diabetes 35.71%, mean eGFR 59.91 ± 26.51 ml/min/1.73m^2.

Primary infectious organs are pneumonia 64.29% and urinary tract infection 21.43%. Percent reduction of IL-6 and CRP after dialysis 4 hours was -4.99 vs -3.19, P=0.94 and -7.45 vs -1.71, P=0.83 in the OL-HDF and low-flux IHD group respectively.

There was no statistically significant difference of percentage reduction of IL-6 and CRP between two group at 48 hours.

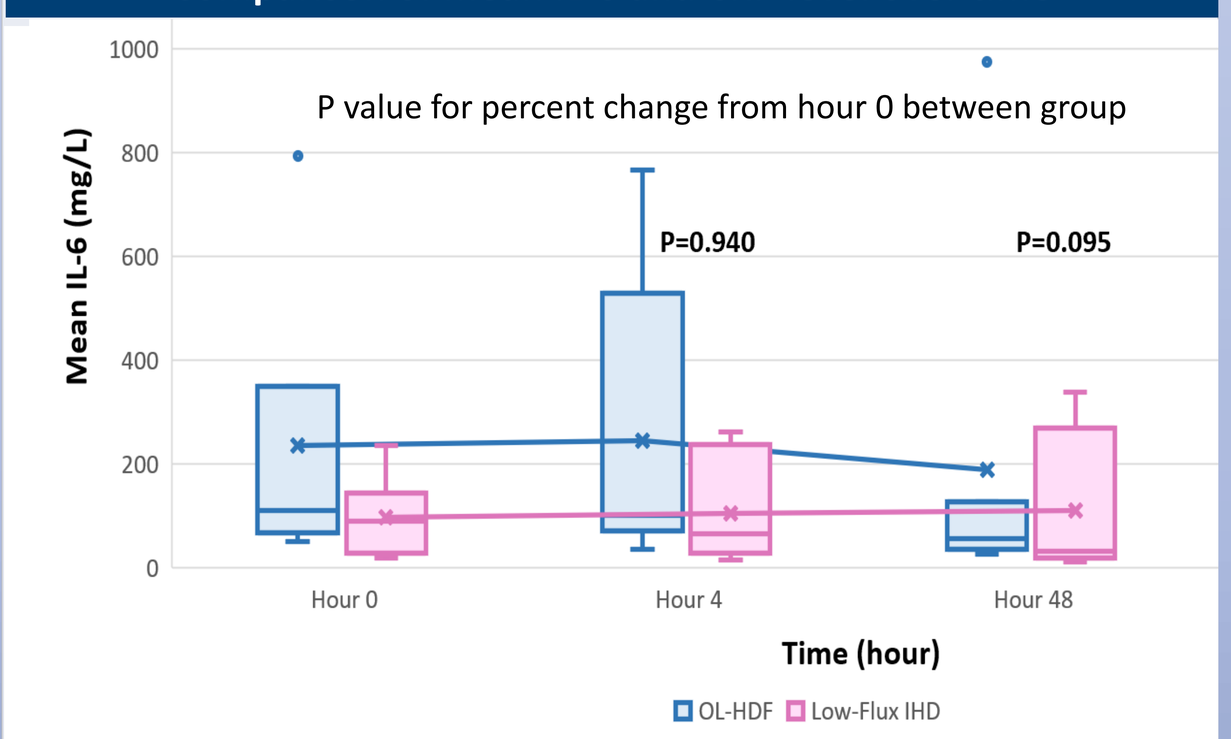
Secondary Outcomes

	OL-HDF (n=7)	Low-Flux IHD (n=7)	P-value
KRT duration (Days), median (IQR)	16 (0-19)	9 (3-30)	0.502
KRT Free Day (Days), median (IQR)	9 (6-16)	12 (7-30)	0.885
Mechanical Ventilator duration (Days), median (IQR)	19 (4-29)	17.5 (9-60)	0.869
Mechanical Ventilator Free Day (Days), median (IQR)	0 (0-6)	3 (0-7)	0.217
Vasopressor duration (Days), median (IQR)	7 (3-24)	9 (3-15)	0.914
Vasopressor Free Day (Days), median (IQR)	17 (1-19)	13.5 (1.5-42)	0.552
ICU Length of stay (Days), median (IQR)	23 (4-29)	16.5 (12-60)	0.845
Outcome at 30 days			
• **Mortality, n(%)**	4 (57.14)	2 (28.57)	0.592
• **Creatinine (mg/dL), median (IQR)**	2.00 (1.55-6.28)	2.23 (1.68-3.47)	0.867
• **eGFR (ml/min/1.73m^2), median (IQR)**	34.00 (7.10-42.00)	24.50 (21.00-28.20)	0.604
• **Renal recovery, n(%)**	2(28.57)	5(71.43)	0.286
Hospital Length of stay (Days), median (IQR)	23 (8-29)	36 (12-60)	0.54
In Hospital mortality, n(%)	5 (71.43)	5 (71.43)	1
Discharge alive and renal recovery, n(%)	2(28.57)	2(28.57)	1

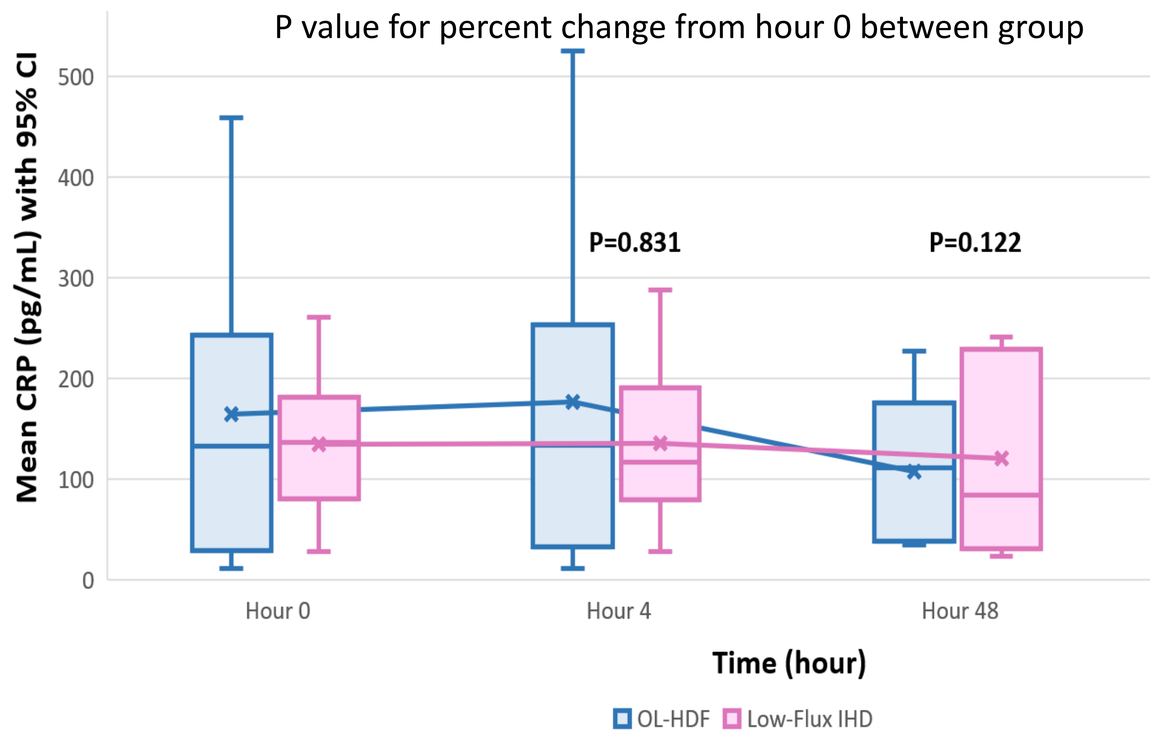
Mixed-effects liner regression model for percentage difference of IL-6 and CRP at time 0 vs 4 hours and at time 0 vs 48 hours

	OL-HDF	Low-Flux IHD	Percentage difference between group		P-value
	Percentage difference	Percentage difference	Percentage difference	[95% CI]	
IL-6					
• **Time 0→4**	-4.99	-3.19	-1.80	[-48.71,45.11]	**0.940**
• **Time 0→48**	43.14	3.15	39.99	[-6.92,86.90]	**0.095**
CRP					
• **Time 0→4**	-7.45	-1.71	-5.74	[-58.61,47.12]	**0.831**
• **Time 0→48**	-25.86	15.81	-41.68	[-94.54,11.19]	**0.122**

Comparison of mean IL-6 and CRP level over time



Mean IL-6 (mg/L)	Hour 0	Hour 4	Hour 48
OL-HDF	236.51 [80.92,392.10]	244.83 [89.24,400.41]	189.17 [33.59,344.76]
Low-flux IHD	97.33 [58.26,252.91]	105.04 [50.54,260.63]	109.89 [45.70,265.47]



Mean CRP (pg/ml)	Hour 0	Hour 4	Hour 48
OL-HDF	164.83 [84.36,245.30]	176.71 [96.24,257.18]	107.27 [26.81,187.74]
Low-flux IHD	134.97 [54.51,215.44]	135.82 [55.36,216.29]	120.23 [39.76,200.69]

Conclusions

Patients with SA-AKI needed dialysis have high mortality rate. OL-HDF did not show significant efficacy for percentage reduction of IL-6 and CRP compared with low-flux IHD.

Contact

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