Role of nafamostat mesilate in prolonging filter patency in patients with high risk of bleeding on continuous renal replacement therapy

Yong Kyu Lee[1], Hae Won Lee[2], Kyu Hun Choi[2], Beom Seok Kim[2]

[1]Nephrology Division, Internal Medicine Department, National Health Institute Corporation, Ilsan Hospital, Goyang, Korea

[2]Nephrology Division, Department of Internal Medicine, Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Introduction

Continuous renal replacement therapy (CRRT) is considered as an effective modality for renal replacement therapy in hemodynamically unstable patients within intensive care units (ICUs). However, role of heparin anticoagulation, which is used to maintain the circuit patency, is equivocal due to risk of bleeding and morbidity. Out of various alternative anticoagulants, nafamostat mesilate shows its merits as ideal anticoagulant when patients are prone to bleeding. Hence, we conducted a prospective randomized controlled study demonstrating the effect of nafamostat mesilate on CRRT filter life span and adverse events in the patients with high risk of bleeding.

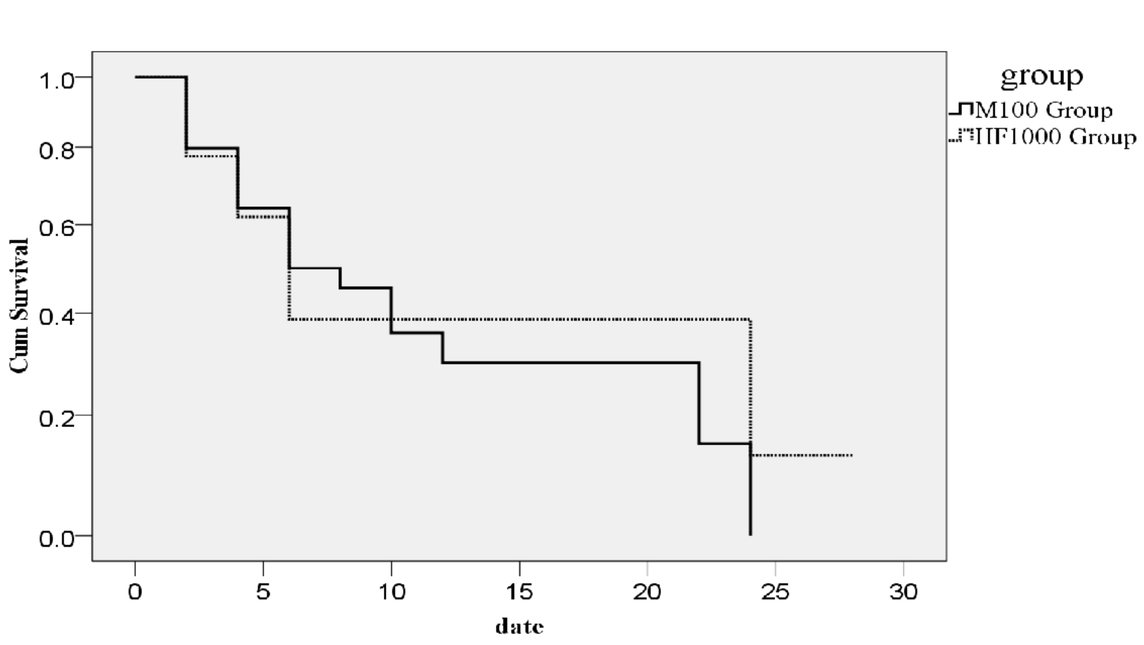
Method

The patients were randomized into HF1000 or M100 groups. The HF1000 group used nafamostat mesilate as an anticoagulant, while M100 group did not used any anticoagulation. Baseline characteristics and appropriate laboratory tests were taken from each group.

Result (I)

Seventy-three patients were enrolled in this study, and there were no significant differences in baseline characteristics between the two groups. Filter life span and numbers of filters used during CRRT were similar in both groups, except overall number of filters during CRRT (4.50 ± 3.25 in M100 group vs. 2.71 ± 2.12 in HF1000 group; $p<0.05$) and number of filters changed due to clots per 24 hours (1.90 ± 1.60 in M100 group versus 1.15 ± 0.81 in HF1000 group; $p<0.05$). However, when filter life span was subdivided by 12 hours, the number of filters functioning over 12 hours were significantly higher in HF1000 group (p<0.05, odds ratio 1.840). There were no significant differences in transfusion, mortality, and survival between the two groups. There were no adverse events related to nafamostat mesilate.

Figure 1. Survival curve of the M100 group and the HF1000 group



Result (II)

Table 1. Baseline characteristics

Characteristics	HF1000 group	M100 group	*P value*
Demographics			
Age (years)	52.97 ± 13.94	57.54 ± 13.04	*NS*
Male, N (%)	24 (66.67%)	20 (54.05%)	*NS*
Underlying disease, N(%)			
Hypertension	14 (38.9%)	13 (36.1%)	*NS*
Diabetes mellitus	13 (36.1%)	8 (22.2%)	*NS*
Vital signs			
SBP (mmHg)	122.42 ± 20.89	121.03 ± 21.33	*NS*
DBP (mmHg)	66.75 ± 15.39	63.68 ± 12.44	*NS*
Pulse rate (bpm)	113.36 ± 24.27	113.35 ± 23.10	*NS*
Laboratory tests at start of CRRT			
WBC (X 10^3/μL)	12.45 ± 11.11	10.49 ± 9.88	*NS*
Hb (g/dL)	8.49 ± 1.55	9.07 ± 1.86	*NS*
Platelet (X 10^3/μL)	57.44 ± 40.05	90.92 ± 97.39	*NS*
ESR (mm/hr)	22.70 ± 25.34	26.67 ± 34.52	*NS*
BUN (mg/dL)	64.09 ± 25.64	61.71 ± 30.16	*NS*
Cr (mg/dL)	3.09 ± 1.09	3.41 ± 1.96	*NS*
Na (mmol/L)	140.28 ± 8.00	140.81 ± 7.49	*NS*
K (mmol/L)	4.19 ± 0.82	4.24 ± 1.06	*NS*
Total CO_2 (mmol/L)	20.63 ± 6.21	21.22 ± 4.96	*NS*
Patient severity index at screening.			
RIFLE criteria			
Risk	4 (11.1%)	9 (24.30%)	*NS*
Injury	10 (27.8%)	8 (21.6%)	*NS*
Failure	22 (61.1%)	18 (51.3%)	*NS*
Loss and ESRD	0	1 (2.7%)	*NS*
Total APACHE II score	26.72 ± 5.26	26.84 ± 6.00	*NS*
Cleveland clinical foundation score	17.31 ± 11.11	13.73 ± 3.25	*NS*

Table 2. Comparison of filters consumed in each group.

	HF1000 group	M100 group	*P value*
Filter life span (hours)			
Overall filters	26.63 ± 21.14	22.70 ± 20.67	*NS*
Filters changed due to clots	27.05 ± 20.29	23.23 ± 19.61	*NS*
Number of filters			
Overall filters	2.71 ± 2.12	4.50 ± 3.25	*<0.05*
Filters changed due to clots	73.4%	72.5%	*NS*
Number of filters/24 hours			
Overall filters	1.60 ± 1.67	1.74 ± 1.62	*NS*
Filters changed due to clots	1.15 ± 0.81	1.90 ± 1.60	*<0.05*

Table 3. Distribution of filter life spans in each group.

	M100 group	HF1000 group	Total
≤ 12hrs	57 (41.3%)	26 (27.7%)	83 (35.8%)
> 12 hrs	81 (58.7%)	68 (72.3%)	62 (64.2%)
Total	138	94	232

Summary and Conclusion

Nafamostat mesilate can be used as an effective and safe anticoagulation method in patients with high risk of bleeding without increasing major bleeding complications.