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Prospective self-crossover study of simplified citric acid and conventional heparin anticoagulant hemodialysis

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Objectives : To compare the effectiveness, safety, and dialysis adequacy of simplified citric acid (Only input 4% citric acid at the arterial end of the pipelines) with conventional heparin anticoagulation hemodialysis.

Methods : A total of 65 maintenance hemodialysis patients were randomly assigned to receive simplified citric acid anticoagulation (Group A, 65times) and conventional heparin anticoagulation (Group B, 65times) hemodialysis by self-crossover. The blood flow rate was 200ml/min , dialysate flow rate was 500ml/min , and 1.5mmol/L calcium containing dialysate was used. The pumping speed of citric acid was adjusted by the serum free calcium levels after 2 hours of dialysis. No additional calcium infusion. Expected dialysis time was 4 hours. The anticoagulant effectiveness: the proportion of patients who completed 4h hemodialysis with filter and pipeline coagulation grade II or below, to the total number of patients. Monitor the coagulation of filters and pipelines, adverse events(such as numbness in the lips and limbs etc.), and dialysis adequacy (Kt/V) during dialysis.

Results : ①The mean citric acid pumping speed in Group A was 428 ± 24 ml/h at initial , and 436 ± 31 ml/h after 2h of dialysis. The mean free calcium was 0.814 ± 0.108 mmol/l after 2h of dialysis. ②The anticoagulant effectiveness of Group A and Group B was 55/65 (84.6%) vs. 62/65 (95.4%), $P=0.076$. ③The incidence of adverse events during dialysis in Group A and Group B was 2/65 (3.1%) vs. 0/65 (0%), $P=0.496$. ④There was no significant difference in Kt/V between the two groups [(1.24 ± 0.34) vs. (1.31 ± 0.25) , $P=0.129$].

Conclusions : Compared with heparin, simplified citric acid anticoagulant hemodialysis was safe, effective, and had similar dialysis conditions,dialysis adequacy. Adjust the citric acid pumping speed by serum free calcium after 2h of dialysis.During the dialysis, it is necessary to avoid low blood flow rate and monitor the venous pot coagulation.