A new citrate anticoagulation protocol in extracorporeal treatment for septic shock patients with Coupled Plasma Filtration Adsorption (CPFA)

OBJECTIVES

From 2001 to 2011 we treated in our centre 94 patients in septic shock with CPFA. CPFA, combining a unselective plasma adsorption on hydrophobic resin (MediaSorb) with a continuous slow hemofiltration proved to be an effective treatment of septic shock patients with or without acute kidney injury (AKI), improving the hemodynamic, the blood chemistry data and the survival.

In ICU most patients are at risk of bleeding due to recent surgery or the presence of abnormal coagulation context, particularly in septic shock patients.

Aim of this study was to elaborate and evaluate a citrate anticoagulation protocol.

METHODS

From 01/12/2009 to 31/12/2011 we treated with CPFA 11 consecutive mechanical ventilated patients, 6 males and 5 females (mean age 59.5 ± 12.6 years), with septic shock and multigorgan dysfunction (MODS 2.0 ± 0.9) and 4 of 11 with AKI; days spent in intensive care unit 30 ± 19.9. We observed all the inclusion criteria of Compact study (ClinicalTrials.gov-Protocol Registration Receipt 2006-05-31). We treated all patients with CPFA-CVVH pre-post dilution, prescribed Qb 10 ml/min, plasma filtration 30 ml/min (18%) using on predilution citrate bag (Na+ 136 mmol/L, Citrate 10 mmol/L, Citric acid 2 mmol/L), on postdilution with infusion bag (Na+ 139 mmol/L, K+ 1.5 mmol/L, Ca++ 2 mmol/L, HCO3- 35 mmol/L, glucose 5.55 mmol/L) and following the next table (Table 1). All biochemical data were collected and analyzed at the beginning of treatment to monitor the performance of different parameters.

RESULTS

We performed 73 treatments accounting for 733 hours, mean duration 8.4 ± 1.0 hrs, mean plasma volume of 12.20 ± 2.8 l, Qp 143 ± 12 ml/min, Qp 24.6 ± 3.8 ml/min, a treated plasma dose/kg body weight of 1 ± 0.37 L/Kg. Mean CaCl2 10% infusion of 4.5 ± 1.3 ml/h, with a citratemia, evaluated as total Ca++/iCa++ ratio, always < 2.5 (1.92 ± 0.14) (Table 2), also in 4 patients with liver dysfunction (mean 2 ± 0.20); the average of the systemic ionized calcium was found to be always within the physiological range (iCa++ 1.1 ± 0.1 mmol/L).

Finally we analyzed blood chemistry data that pointed out a mean bicarbonatemia of 25.3 ± 4.8 mmol/L and a mean pH of 7.42 ± 0.05; also we evaluated the coagulation status of the patient with the means of the PT (57.5 ± 13.2) and PTT (50 ± 10.7 sec) (Table 3).

CONCLUSIONS

The protocol in use in our centre allowed us to obtain an elevated dose of plasma/Kg patient with a circuit life longer that other anticoagulation methods.

We observed an elevated survival at 28 and 90 days related to clinical status of patients (72.7% and 63.6%, respectively; Table 4).

We observed that the convective dose was less important, because during the treatment the MediaSorb was enough effective in the cytokines removal. Nevertheless, we guarantee in each treatment a minimal convective dose of 20 ml/Kg/h.

Table 1. Protocol scheme citrate-calcium chloride infusion

Table 2. Average Ca++/iCa++ for each patient to verify the non-toxicity of citrate at the end of CPFA cycle

Table 3. Average PT and PTT for each patient: lack of significant changes in buoyancy of the blood chemistry data

Table 4. E elevated survival at 28 and 90 days related to clinical status of patients

REFERENCES:


Authors: Marco Pozzato MD, Fiorenza Ferrari MD, Pasqualina Cecere MD, Paola Mesiano MD, Antonella Vallero MD, Sergio Livigni MD and Francesco Quarello MD

Hospital: 1 Nephrology & Dialysis Unit and 2 ICU, S. Giovanni Bosco Hospital, Turin, Italy