SPECIFIC ASPECTS CONCERNING CONTINUOUS HEMOFILTRATION IN CRITICALLY ILL PATIENTS

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Continuous veno-venous hemofiltration (CVVH) is extensively used for the treatment of acute renal failure in the critically ill patient. Of growing interest are the experimental evidence and clinical observations that hemofiltration has some benefits in improving clinical condition of septic patients, but there is no general consensus regarding these aspects. Current practice worldwide is extremely variable, but in many units, the continuous renal replacement therapies have replaced the intermittent hemodialysis, and the intensivist has become a trained specialist in utilizing these techniques, with or without the participation of the nephrologist. The current paper is the consequence of a local initiative for implementing a continuous renal replacement program in the general ICU I in the above mentioned hospital.

The study has two parts: part A that focusses on the technical aspects of initiating and maintaining a CVVH treatment, and part B, that refers to some specific clinical aspects concerning the use of CVVH treatment in the ICU. Both are prospective studies, of 77 caucasian adults, admitted to a 35 bed general ICU, between 01.07. 2001- 30.09. 2005 and treated for renal or non-renal indications with CVVH. The statistical methods used were t-Student test and CHI square test.

Study A. OBJECTIVES: 1. to establish the influence that the place of insertion of the vascular access and the treatment parameters have upon the CVVH efficiency in the critically ill patient; 2. to identify the technical and clinical factors that contribute to optimize the filter’s life; 3. to establish technical guidelines for initiating and maintaining a CVVH treatment for the critically ill patient.

MEASUREMENTS AND MAIN RESULTS: we determined the life span of indwelling dialysis catheters with different vascular accesses, the correlations between spontaneous mobilization of patients and patency of femoral vein access, the correlation between the optimal functioning of the vascular access and the positive inspiratory pressure above 45 cm H2O for mechanically ventilated patients having subclavian or internal jugular vein access, the hemodynamic variation of two technical ways of initiating CVVH in hemodynamically unstable patients, the influence that some factors have on the filter’s lifespan (heparin anticoagulation, saline flushes, pre or postdilution, ultrafiltrate volume, transmembranar pressure, the target of anticoagulation, the coagulation disorders prior to CVVH initiation, hemodilution and transfusion during therapy, influence of septic shock states). We found that the best vascular access for the critically ill patient is the internal jugular vein, that femoral vein can be safely used even in spontaneous mobilised patients, provided a good nursing, that jugular vein and subclavian vein access do not function properly in mechanical ventilated patients with positive inspiratory pressures of more than 45 cm H2O. We also concluded that initiating CVVH by connecting simultaneously both lines has minimal hemodynamic impact in unstable critically ill patients, and the only parameters that influence the filter’s life are thrombocytopenia of less than 50000/ mm3 and the septic shock state. We established also technical guidelines for maintaining CVVH during transportation and during prone position ventilation of critically ill patients. We have studied the learning curve of CVVH.
and have found a minimum of 1500 hours of practice or 30 patients to treat for the ICU specialist to manipulate in best conditions the technique.

Study B. OBJECTIVES: 1. to establish the influence of CVVH treatment on the outcome of the critically ill patient; 2. to identify the optimal dialysis dose for improving organ function; 3. to identify the best moment for initiating CVVH for improving organ function; 4. to identify the optimal dialysis dose and the best moment for initiating CVVH in critically patient with acute renal failure; 5. to asses the role of CVVH treatment for acute severe pancreatitis; 6. to asses the role of CVVH treatment for acute exogenous poisoning.

MEASUREMENTS AND MAIN RESULTS: we divided the 77 patients in three groups- a septic group (50 patients), an acute renal failure group without sepsis (17 patients), and an acute exogenous poisoning group (10 patients). We also studied all 66 acute renal failure patients of different causes emerging from all these 3 groups. We studied the course of the SOFA score after CVVH initiation, and we identified a favorable evolution of this score in acute renal failure and septic patients, and no improvement for the poisoned patients. The obtained mortality was smaller than the expected mortality predicted by the SOFA score in septic and acute renal failure patients, and higher for the group of patients with acute poisoning. For the sepsis group we found an improvement of respiratory parameters, of hemodynamic parameters and use of inotropic agents; we also found a better survival for ARDS patients, for septic patients and acute renal failure patients correlated with the precocity of treatment initiation. We found that CVVH has favorable effects on severe acute pancreatitis patients, the 28 days survival of these patients being superior to the expected survival predicted by the Ranson score. We have also established antimicrobial dosing guidelines for treating septic patients with CVVH.

CONCLUSIONS: 1. The internal jugular vein access has the longest time of functioning for the critically ill patient treated with CVVH; 2. The internal jugular and subclavian vein accesses do not function properly in the presence of peak inspiratory pressures of more than 45 cmH2O in mechanically ventilated patients; 3. filter’s lifespan is improved by thrombocytopenia of less than 50000/mm3 and in the case of a septic shock state, and is not influenced by the other mentioned parameters; 4. CVVH improves clinical course of septic and acute renal failure critically ill patients, and has no benefits on acute poisoned patients; 5. SOFA score has no predictive value (using the rule of more than 11 points) in assessing the outcome of the critically ill patients treated with CVVH; 6. the over all dialysis dose correlates with 28 days survival in critically ill and septic patients; 7. the rapid initiation of CVVH improves outcome in critically ill and septic patiets; 8. CVVH has favorable effects on organ disfunction course; 9. initiating CVVH at values of serum creatinine of less than 5 mg/dl improves 28 days survival in critically ill patients with acute renal failure; 10. CVVH is benefic in severe acute pancreatitis; 11. the suggested guidelines (initiating CVVH, priming the CVVH circuit, anticoagulation, drug dosing, CVVH and prone position ventilation and CVVH during patient transportation ) are safe and correct ; 12. CVVH is a therapeutic tool correctly and safely used by intensivists, with or without the nephrologist’s participation, that requires 1500 hours of practice or 30 treated patients for an optimum delivery of the technique by the specialist in intensive care.