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RENAIL REPLACEMENT THERAPY IN ECMO, MODALITIES, ACCESS AND SAFETY PROFILE: EXPERIENCE OF AN ECMO CENTRE IN A DEVELOPING COUNTRY

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Category: RRT Applications and Targeted Interventions
Presenter: Dr POOJA WADWA
Keywords: ECMO, CRRT, Fluid Balance, AKI

Introduction: ECMO (Extra Corporeal Membrane Oxygenation) is a lifesaving modality for patients with severe organ dysfunction. The incidence of Acute Kidney Injury (AKI) in such patients is very high. Fluid overload is the single most important predictor of mortality in such patients andContinuous Renal Replacement Therapy (CRRT) is the preferred modality to manage it, alongside AKI and metabolic disturbances. In India, ECMO with CRRT is a rarely used modality and very few centers practice it.

Objective: To assess the experience of a tertiary care center in India of combining ECMO with CRRT during the first 3 years of inception.

Method: We collected data retrospectively of 30 patients on ECMO from Dec 2013 to Dec 2016 at our center. All data related to prevalence of AKI (by AKIN criteria), indications, modality and access for RRT and associated complications were collected. Outcome parameters like survival and net fluid balance were determined.

Results: Of the 30 cases, 18 (60%) underwent some form of RRT while on ECMO. Nine patients (30%) each were on Venoarterial (VA) and VenoVenous (VV) ECMO. Seven (38.9%) of these were on ECMO and CRRT were more patients with primary respiratory diseases in survivor group (77.8% vs 17.8%, p <0.01). Similar findings were observed between survivors and non-survivors for ECMO blood flow rate (3.96±0.56 vs 3.5±0.6, p=0.06), ECMO duration (16.7±14.1 vs 13.8±16.1, p=0.64) and length of stay in intensive care unit (ICU) (29.3±25.6 vs 15.0±17.0, p=0.16). ECMO-CRRT configuration was the same for all cases, except for one case in which CRRT was conducted with non-tunneled dialysis catheter. Indications for CRRT treatment included acute kidney injury, fluid overload and metabolic disturbances. 23 patients received systemic ECMO anticoagulation with unfractionated heparin infusion at 12-18unit/kg/hour while 4 patients in non-survivor group received regional citrate anticoagulation for CRRT.

Baseline creatinine before CRRT was 327.7±233.9μmol/L and percentage creatinine change was 41.4±21.2%. CRRT treatment hours (151.6±191.1 hours), total fluid removal with CRRT (12.9±18.1 liters) and number of hemofilter change (5.0±4.6) were not associated to increase in mortality.

Conclusion: In this series of 27 patients managed with ECMO and concomitant CRRT in an adult ICU, survival to ICU discharge was 33.3%. Mortality risk was increased in patients with circulatory failure but not it was not associated with CRRT treatment mortality.

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OUTCOMES EVALUATION OF PATIENTS ON EXTRACORPOREAL MEMBRANE OXYGENATION WITH CONCOMITANT CONTINUOUS RENAL REPLACEMENT THERAPY

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Category: RRT Applications and Targeted Interventions
Presenter: Mr PETER CHI KEUNG LAI
Keywords: Extracorporeal Membrane Oxygenation, Concomitant Continuous Renal Replacement Therapy

Introduction: Patients on Extracorporeal Membrane Oxygenation (ECMO) often have acute kidney injury or fluid overload requiring Continuous Renal Replacement Therapy (CRRT). There was evidence that ECMO patient requiring CRRT had higher mortality due to increased severity of illness, but it is uncertain how CRRT affects outcomes of ECMO patients.

Objectives: To explore the characteristics of ECMO survivors who underwent concomitant CRRT.


Results: 12 patients had veno-venous ECMO and 15 had veno-arterial ECMO. Indications for ECMO were hypoxemic respiratory failure refractory to conventional therapy, cardiogenic shock associated with myocardial infarction, myocarditis and cardiac arrest. Mean age was 49.4±14.8 years. 9 ECMO-CRRT patients survived and 18 died. There were more patients with primary respiratory diseases in survivor group (77.8% vs 17.8%, p<0.01). Similar findings were observed between survivors and non-survivors for ECMO blood flow rate (3.96±0.56 vs 3.5±0.6, p=0.06), ECMO duration (16.7±14.1 vs 13.8±16.1, p=0.64) and length of stay in intensive care unit (ICU) (29.3±25.6 vs 15.0±17.0, p=0.16). CRRT-ECMO configuration was the same for all cases, except for one case in which CRRT was conducted with non-tunneled dialysis catheter. Indications for CRRT treatment included acute kidney injury, fluid overload and metabolic disturbances. 23 patients received systemic ECMO anticoagulation with unfractionated heparin infusion at 12-18unit/kg/hour while 4 patients in non-survivor group received regional citrate anticoagulation for CRRT.

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Conclusion: In this series of 27 patients managed with ECMO and concomitant CRRT in an adult ICU, survival to ICU discharge was 33.3%. Mortality risk was increased in patients with circulatory failure but not it was not associated with CRRT treatment mortality.

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DOES VANCOMYCIN TROUGH CONCENTRATION USEFUL TO PREDICT OPTIMAL DOSING DURING CONTINUOUS VENOVENOUS HAEMOFILTRATION? PRELIMINARY FINDINGS FROM THE VALLEY STUDY

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Keywords: Vancomycin, Continuous Renal Replacement Therapy

Introduction: Previous studies have shown that monitoring trough concentration is useful to predict optimal dosing of vancomycin in patients undergoing continuous renal replacement therapy. However, the results from the study are conflicting. An increase in vancomycin trough concentration may be harmful to patients by increasing the risk of nephrotoxicity, whereas a decrease in trough concentration may result in treatment failure.

Objective: To determine if vancomycin trough concentration is useful to predict optimal dosing of vancomycin in patients undergoing continuous renal replacement therapy.

Methods: A retrospective study was conducted on patients who underwent continuous renal replacement therapy in a university-affiliated hospital from January 2015 to December 2016. Patients were included if they received vancomycin for the treatment of bacterial infections while on continuous renal replacement therapy.

Results: A total of 120 patient episodes were included in the study. The mean vancomycin trough concentration was 10.2±5.6 μg/mL. There was no significant difference in vancomycin trough concentration between patients who received optimal dosing and those who received suboptimal dosing (10.6±5.7 μg/mL vs 9.8±5.4 μg/mL, p=0.46). However, patients who received suboptimal dosing had a higher incidence of nephrotoxicity (21.4% vs 12.2%, p=0.46).

Conclusion: Vancomycin trough concentration is not useful to predict optimal dosing during continuous venovenous haemofiltration. Further studies are needed to determine if other factors such as renal function or protein binding are more useful in predicting optimal dosing of vancomycin.
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Category: RRT Research
Presenter: Dr FARIZ SAHFAN MOHAMAD NOR
Keywords: vancomycin, continuous renal replacement therapy, pharmacokinetics

Introduction: Achieving optimal vancomycin dosing, particularly in septic critically ill patients receiving continuous renal replacement therapy (CRRT) is crucial. Established guidelines recommend the use of trough concentrations to manage vancomycin dosing in adult patients with gram-positive infections. Importantly, obtaining the area under the plasma concentration-time curve (AUC), based on the pharmacokinetic / pharmacodynamics (PK/ PD) concept, is extremely required.

Objective: This study aimed to describe the pharmacokinetics (PK) of vancomycin in Malaysian critically ill patients receiving CRRT, and the achievement of its therapeutic target, the ratio of the AUC to the MIC of causative pathogen (AUC/MIC >400), using a standard dosing regimen (750 mg 12 hourly). Methodology: This was a prospective PK study of vancomycin using standard dosing regimen, in critically ill patients receiving continuous venovenous haemofiltration (CVVH). Blood samples were collected at ten sampling times during a dosing interval. PK analyses were evaluated using non-compartmental method. Vancomycin trough concentrations (15-20 mg/L) and the achievement of the ratio of AUC/MIC>400, based on selected susceptibility breakpoint (MIC=1 mg/L), were evaluated.

Results: Fifty blood samples from five PK profiles of five patients were analysed. The median (interquartile range) of vancomycin total clearance (CL(total)) and volume of distribution (Vd) were 62.8 (45.1-62.7) mL/min and 62.0 (48.7-94.2) L respectively, during CVVH. Maximum concentration, Cmax=30.8 (30.5-33.2) mg/L was observed at 1.8±0.3 h. The standard dosing regimen (750 mg 12 hourly) resulted in AUC(0-24) and Cmin of 400.1 (399.0-504.1) mg.h/L and 12.1 (10.7-16.1) mg/L, respectively. Of these, only two patients, who were anuric, obtained trough concentration between 15-20 mg/L and subsequently achieved the targeted AUC/MIC>400 (MIC=1 mg/L).

Conclusion: Obtaining trough concentration between 15-20 mg/L, relatively achieved the desired AUC/MIC >400 for vancomycin during CVVH. Higher trough concentration (e.g 20-25 mg/L) may be required when targeting for a higher MIC (e.g >1mg/L). Initiation of a higher dosing regimen could also be necessary, particularly in patients undergoing CVVH with significant residual native renal function. Further data is required, from continuation of this study, to clarify the findings.

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ACUTE RENAL REPLACEMENT THERAPY IN INTENSIVE CARE SETTING: A SINGLE TERTIARY CENTRE EXPERIENCE
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Category: RRT Research
Presenter: Dr MALINI SHANMUGANATHAN
Keywords: RRT, Critical Care Nephrology, AKI

Introduction: The number of patients requiring renal replacement therapy (RRT) due to acute kidney injury (AKI) is increasing in trend. Achieving optimal vancomycin dosing, particularly in patients with sepsis and multi organ dysfunction (MOD) were more likely to be on CRRT. Mortality rate in that group was higher at 64%. A significant number of these patients were diabetic (p=0.031).

Conclusion: There has been a tenfold increase in the number of acute RRT procedures performed over the past 10 years. However this tremendous rise has not been matched by a mere increase from 10 to 20 dialysis staff throughout this period. As AKI is a common complication in critically ill patients, efficient and prompt critical care nephrology treatment is of utmost importance in ensuring better outcome for patients.

Table 1: Baseline characteristics

<table>
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<tr>
<th>Gender (%)</th>
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<td>Male</td>
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<td>Female</td>
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<th>Age, mean (SD)</th>
<th>Range (%)</th>
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<td>52.1(16.0)</td>
<td>10-44</td>
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<td>45-54</td>
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<th>Race (%)</th>
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<td>Indian</td>
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<table>
<thead>
<tr>
<th>Comorbidities (%)</th>
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<tbody>
<tr>
<td>Diabetes</td>
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<tr>
<td>Hypertension</td>
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<td>IHD</td>
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AN ANALYSIS OF FIXED VERSUS ADJUSTABLE DOsing IN CONTINUOUS RENAL REPLACEMENT THERAPY IN CRITICALLY ILL PATIENTS WITH ACUTE KIDNEY INJURY
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Category: RRT Technique Characteristics
Presenter: Dr WAN HASNUL HALIMI WAN HASSAN
Keywords: CRRT, AKI, Fixed CRRT dosing, Adjustable CRRT dosing, outcome

Introduction: Fixed CRRT dosing between 20-35 ml/kg/hr has been shown effective and improves renal function an reduced mortality. Locally, we will adjust the CRRT dosing periodically depending on the patient’s response.

Methods: This retrospective study was conducted in a general hospital in Kelantan, Malaysia. Medical records of all patients admitted to ICU from January 2016 to March 2017 with diagnosis of AKI were reviewed for inclusion criteria. All critically ill adults patient (>18 years old) diagnosed with AKI with any types of CRRT and completed at least 48 hours treatment were enrolled in this study.

It was considered to be fixed dose of CRRT if the patient received a fixed dosing throughout the treatment and adjustable dose if, at any time, the managing physician alter the dosing on intention-to-treat basis.

The data was analysed using IBM SPS statistics version 20.0 for Windows software. A p value of <0.05 was considered statistically significant.

Results: A total of 24 critically ill patients with acute kidney injury (AKI) were included in the analysis after considering inclusion and

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