MANAGMENT OF AKI IN NEWBORN WITH MINIATURIZED EQUIPMENT FOR CRRT CARPEDIEM
FIRST WORLD CASE REPORT

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Background

Continuous renal replacement therapy (CRRT) is becoming the treatment of choice to support critical pediatric patients with AKI, fluid overload (FO) and hemodynamic instability. This therapy is usually performed with machines designed for adults. In these patients mortality is associated with the presence of MODS, patient weight, and the severity of FO. We report the first patient treated with the Carpediem, Cardio-Renal Pediatric Dialysis Emergency Machine, a newly miniaturized equipment designed for neonates: this is a case of an infant with severe FO who received CRRT primarly to remove fluid excess.

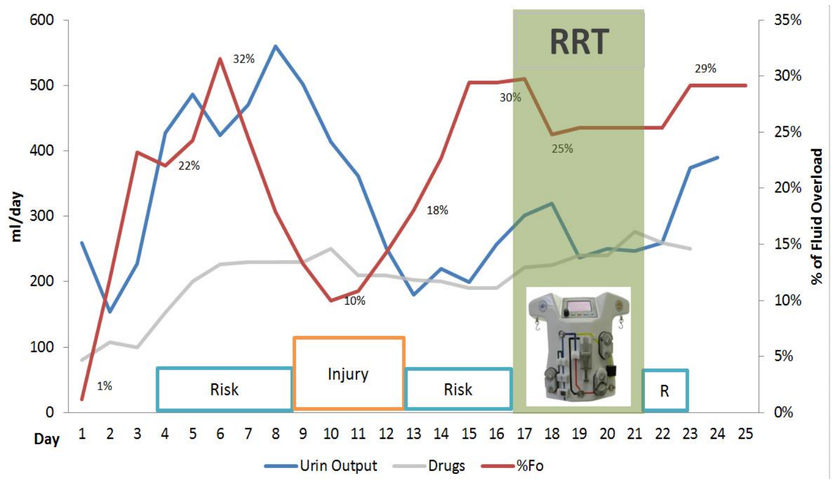

Figure 1 *Trend of UO, Drugs and %FO with pRIFLE classification*

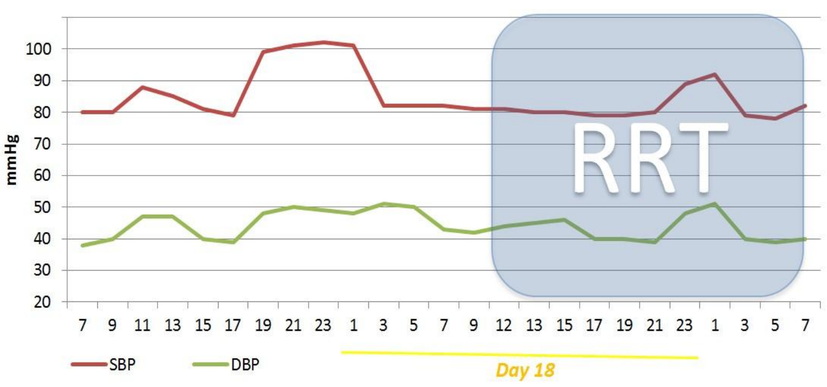

Figure 2 *Systolic and Diastolic Pressures before and during RRT*

Case Report

Patient 10 weeks-old male infant (3.2 kg) was transferred from a community hospital and admitted to the PICU with sepsis and acute lung injury due to severe combined immunodeficiency syndrome.
Medications include 2 inotropes and almost one potential nephrotoxic agent (aminoglicosid). He was sedated and intubated 10 hours after admission.
Adequate diuresis was always maintained with continuous infusion of diuretics. The degree of FO, calculated as

$$\%\ FO = \left[\frac{\text{Fluid Intake - Fluid Out}}{\text{pICU Weight}} \right] * 100\%$$

Fluid intake: total input from pICU admit to day of evaluation
Fluid out: total output fron pICU admit to day of evaluation

was 24% of body weight on the Day 4 (Fig 1). Concomitant with bone marrow transplantation on Day 6, fluid intake rise to 709 ml/day (32% of FO) and patient had a further decline in renal function probably due to the amount and the total dose of drugs gave.
The fluid balance was dramatically positive from the 12th day. Urine output of 200-300 ml/day did not compensate the total intake. To reduce the degree of FO, became 30%, 500 ml/day of fluid was removed with CRRT from day 17 to 21. The treatment initiations was delayed due to organizational characteristics. The particular condition and the low weight of the patient required a multidisciplinary and collegial agreement.
The pRIFLE was calculated to better describe the renal function. pRIFLE was R concomitant with bone marrow transplantation on Day 6, reaching pRIFLE I on Day 9 anticipating the incoming diuresis contraction. See figure 3. As the primary conseguence of the reduction of fluid prescribed, showed on figure 2, the pRIFLE got back to R class.

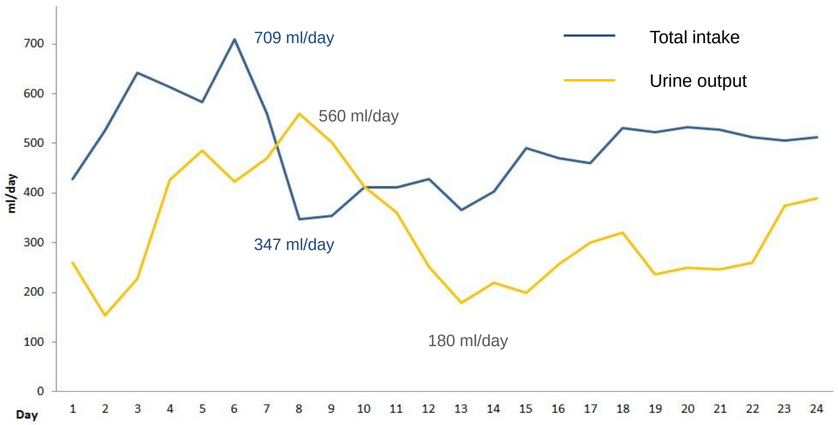

Figure 3 *Graph shows the trend of total intake and diuresis*

Figure 4 *The first CaRPeDiEM application*

To avoid common complications such as: temperature, vascular access, excess of extracorporeal priming volume, the CaRPeDiEM was utilized. Pre-diluition CVVH was performed for 61 hours without significant hemodynamic disturbance, technical complications or need for more inotropic agents. Heparin was continuously infused. Blood pressure was stable, particularly around the time of CRRT initiation (fig2), without any hypotension episode for all the entire duration of CRRT
The D50 circuit (0.075m² surface area) was used.
No clotting occurred in the extracorporeal circuit thanks to accurate anticoagulant monitoring. The main reason for CRRT discontinuation was recovery of renal function. Patient died 2 days after for respiratory failure. FO was reduced by 17% over the 61 hours of CRRT.

Conclusions

A critically ill newborn underwent CRRT with CARPEDIEM, showing an improvement of cardiac, pulmonary and hemodynamic parameters, maintaining optimal fluid and circulatory stability.
CARPEDIEM can be an effective CRRT machine for small size infants, avoiding typical complications and risks due to the adults machine use.

References

Fluid Overload and Mortality in Children Receiving Continuous Renal Replacement Therapy: The Prospective Pediatric Continuous Renal Replacement Therapy Registry. Sutherland SM, Am J Kidney Dis. 2010 Feb.

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