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CRRT for non-AKI indication

- The role of continuous renal replacement therapy (CRRT) has been expanding beyond support for acute kidney injury (AKI) in recent years.
- CRRT has evolved to be an indispensable treatment for a wide spectrum of conditions.
- Children with malignancy are particularly at risk of developing conditions that may require CRRT.
- We reported a patient with malignancy who received CRRT for non-AKI indications.
Continuous Renal Replacement Therapy (CRRT) for Non renal Indications among Critically Ill Children with Malignancy

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Case presentation

❖ A 17-year-old girl with a history of B-cell acute lymphoblastic leukemia (ALL) was admitted for generalized malaise, poor appetite, and weight loss over 6 weeks
❖ Her initial blood investigations revealed hemoglobin 11.3 g/dL, white blood cell 3700, and platelet 83000 with no blast identified
❖ Her urea and creatinine levels were normal, but she had mild electrolyte disturbances with a serum potassium 3.3, phosphate level of 6, and uric acid level of 4
❖ She also had severe lactic acidosis with a blood pH 7.18, pCO2 3.8, bicarbonate 10.3, base excess −10.0, and lactate 15 mmol/L
Case presentation

- She was given bicarbonate infusion at a concentration of 30 mg/L and was hemodynamically stable upon PICU admission.
- Bone marrow examination confirmed relapse of ALL, and no metabolic or toxicological cause was identified for the lactic acidosis.
- The bicarbonate infusion was stepped up to 100 mg/L; however, the lactic acidosis persisted with a peak lactate level 18 mmol/L, lowest pH 7.13, and bicarbonate level 6.0 mg/L.
- Owing to the refractory metabolic acidosis, she was started on high-volume hemodiafiltration for lactate removal.
Case presentation

★ She received altogether 160 hours of CRRT with a peak dialysate flow rate of 89.8 ml/kg/hour
★ The maximal prescribed dose (replacement flow plus dialysate flow) was 111 ml/kg/hour
★ The mean lactate clearance achieved was 65 ml/kg/hour. She experienced transient hypotension at the initiation of CRRT which spontaneously recovered
★ There was mild hypokalemia, hypophosphatemia, and hypomagnesemia during the treatment
★ Otherwise, no major complication was encountered
★ Her lactate level slowly decreased, and the lactate level after CRRT treatment was 7.8 mmol/L
★ She was discharged from PICU 11 days after admission
# CRRT parameters

<table>
<thead>
<tr>
<th>Technique</th>
<th>High-volume hemodiafiltration</th>
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</thead>
<tbody>
<tr>
<td>Time to therapy (hour)</td>
<td>11.9</td>
</tr>
<tr>
<td>Mean blood flow rate (ml/kg/min)</td>
<td>4.7</td>
</tr>
<tr>
<td>Mean dialysate rate (ml/kg/hour)</td>
<td>72.7</td>
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<tr>
<td>Mean dose (ml/kg/hour)</td>
<td>94.8</td>
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<tr>
<td>Anticoagulation</td>
<td>Heparin</td>
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<tr>
<td>Treatment duration (hour)</td>
<td>160.9</td>
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</tbody>
</table>
Case presentation

➔ This case demonstrated that CRRT can be utilized effectively and safely in a wide spectrum of conditions among children with malignancy

❖ Lactate is a small molecule with a molecular weight of 90 daltons, making it favorable for dialysis clearance

❖ Although the clearance of CRRT may not be comparable to hemodialysis, the ongoing production of lactate may favor the use of CRRT

❖ A high dose of dialysate component is required for clearance of toxic metabolite with small molecular weights using CRRT, especially for neurotoxic substances such as ammonia as the duration of exposure to high level of toxic metabolite is crucial to the long-term outcome
Thank you for your attention