Introduction

- Acute kidney injury (AKI) is one of the potentially fatal complications of DKA, although it is rare.
- KDIGO (Kidney Disease – Improving Global Outcomes) AKI definition for children:
  - Increase in serum creatinine by ≥26.5 micromol/L (≥0.3 mg/dL) within 48 hours.
  - Increase in serum creatinine to ≥1.5 times baseline within the previous seven days.
  - Urine volume ≤0.5 mL/kg/hour for six hours.
- Reported mortality in AKI complicating DKA is about 50%.
- So far, only few case reports of DKA with AKI have been reported in the literature.
- We present 3 cases of DKA complicated by AKI.

Case Series

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>9 yrs</td>
<td>14 yrs</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td>Female</td>
<td>Female</td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td>Newly diagnosed T1D</td>
<td>Newly diagnosed T1D</td>
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<tr>
<td><strong>Presentation</strong></td>
<td>Severe DKA</td>
<td>Severe DKA</td>
</tr>
<tr>
<td><strong>BP</strong></td>
<td>Initially normal</td>
<td>Normal</td>
</tr>
<tr>
<td><strong>Urine output</strong></td>
<td>Oliguria &lt; 0.5 ml/kg/day at 36 hours</td>
<td>Reducing urine output at 24 hrs and oliguria at 36 hours</td>
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<tr>
<td><strong>USS Kidney</strong></td>
<td>Kidneys appeared large &amp; bilateral hydronephrosis (ATN induced papillary necrosis)</td>
<td>Enlarged kidney</td>
</tr>
</tbody>
</table>

Renal parameters and management

- AKI is a rare complication of DKA in children.
- Etiology of AKI is almost certainly multifactorial presumably due to hypovolemia and hypotension.
- The 3 cases we present had severe DKA and dehydration leading to hypovolemia.
- Prolonged hypoperfusion of kidneys initiate AKI leading to renal failure.
- The principle of fluid management in children with DKA is conservative while rapid correction of hypovolemia is needed to prevent AKI, thereby presenting a dilemma to the clinicians.
- Renal rescue therapy (RRT) should be initiated prior to the development of significant signs and symptoms of AKI induced renal failure.
- Early initiation of RRT in critically ill child requires collaboration with multidisciplinary team including paediatric nephrologist and critical care to improve outcome.

Conclusions

- Patients with severe DKA are at risk of AKI due to hypovolemia.
- Appropriate management of hypovolemia and electrolyte disturbance in these patients can be challenging.
- These cases highlight the importance of early recognition of AKI (rising plasma urea, creatinine and oliguria) and discussion with paediatric nephrologist to formulate an individualised fluid therapy in order to prevent deterioration in renal function.
- The impact, if any, of recent modification in fluid management of children with DKA, on the risk of AKI remains uncertain.

References