A 24 years old gentleman admitted generally unwell with nausea, vomiting, polydipsia, polyuria and confusion

**Background:**
Asthma, Glaucoma

**Examination:**
Profoundly unwell, clammy, ketone smell
Central obesity, 2 purple striae, groin abscesses
Sats: 100%, RR: 30, BP: 151/69, HR: 69, Temp: 36.9°C

**Labs:**
Glucose: 22.4 mmol/mol, Creatinine: 138, Na: 130, K: 3.4, pH: 6.97, Bicarbonate: 3.0, Blood and urine ketones: High (>10), Hb: 177, WBC: 21.6, HbA1C: 109 mmol/mol, ECG: normal (Figure 1)

**Impression:** New onset Type 1 DM with severe DKA

**MHDU Admission**
DKA Protocol started (0.9% Saline, Fixed rate Insulin, 10 Units/h, KCL 10mmol/h), S/C Lantus, Antibiotics and VTE Prophylaxis

4 h Later: Patient remained unwell, confused, polyuric, bicarbonate: 5, ketones: High, BM: 10.1 mmol/mol, K: 2.3, Insulin increased to 11 units/h, KCL ii tds started along with IV KCL at 10 mmol/h

8 h Later: No improvement and new ECG changes, K: 1.7, BM: 8.1 mmol/mol, Ketones: High, Bicarbonate: 2.0, ECG: Marked ST depression in V2-V6 (Figure 2)

**ITU Admission**

10 h Later: Patient was transferred to ITU
IV KCL was increased to 20 mmol/h. Insulin was temporarily suspended until K > 3.0 mmol/L. Slow clinical improvement although K remained < 3.3 mmol/L

17 h Later: IV KCL increased to 40 mmol/h (Serum K remained between 3.3 to 3.6), IV Insulin infusion restarted

For next 48 h: Patient needed 60 mmol/h IV KCL to maintain K > 4.0 mmol/L, ECG: Normal (Figure 3). Patient made a full recovery and was established on S/C insulin therapy

**Discussion**

**Hypokalaemia in DKA**
Patients with DKA have significant total K deficit. However, Serum K is often normal/high at presentation due to Insulin deficiency, hyperosmolality and acidosis

The change in K distribution is rapidly reversed after Insulin administration, resulting in often dramatic fall in serum K concentration despite K replacement (1)

Hypokalaemia at presentation of DKA, before Insulin treatment is started, is exceedingly rare and increases the risk of life-threatening hypokalaemia during treatment

**Conclusion**
We describe a unique case of DKA in which IV Insulin Infusion was suspended for 7 hours, to allow potassium replacement to a safe level, in a young man with life-threatening ECG changes.

Very few cases have been described in literature where potassium dropped to such an extent during management of DKA

**Literature Review**
A multicentre, retrospective and cross-sectional study of 537 adults with DKA. Only 1.3% patients had K < 3.5 mmol/L at presentation, and none with K < 3.3 mmol/L (2)

**Case Report:** A previously healthy 8 years old girl presented with new onset Type 1 DM and severe DKA (pH: 6.98, profound hypokalaemia K: 1.7 mmol/L accompanied by arrhythmia)

Insulin therapy was delayed for 9 hours to allow replacement of K to safe levels (3)

**JDBS guidance on Hypokalaemia and DKA**
Hypokalaemia is potentially life-threatening during management of DKA. If serum K falls < 3.5 mmol/L, K regimen needs a review

Where fluid balance permits, an increase in rate of 0.9% NaCl with 40 mmol/L IV infusion of KCL is possible

Otherwise, a more concentrated K infusion is needed via Central line to ensure safe practice (4)

Reference 2: JDBS guidance on Hypokalaemia and DKA. 2013

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