



Case History

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^o 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:2.9**, 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:8.1mmol/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

Figure:1

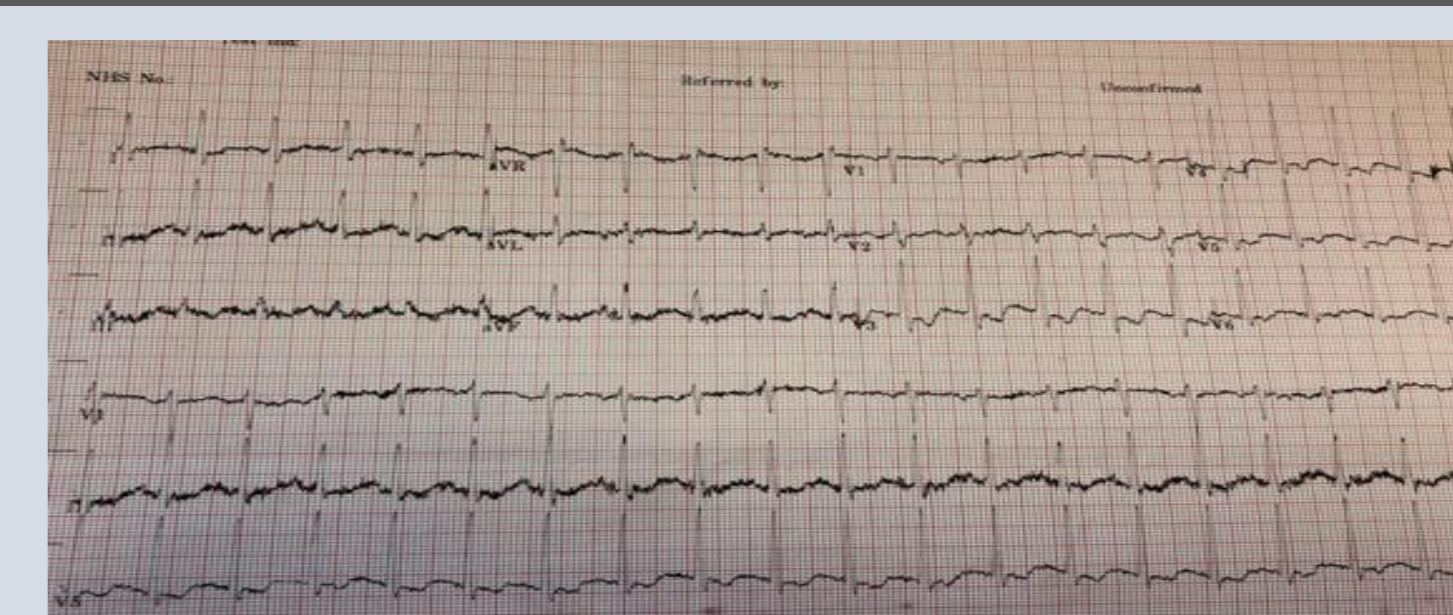


Figure:2

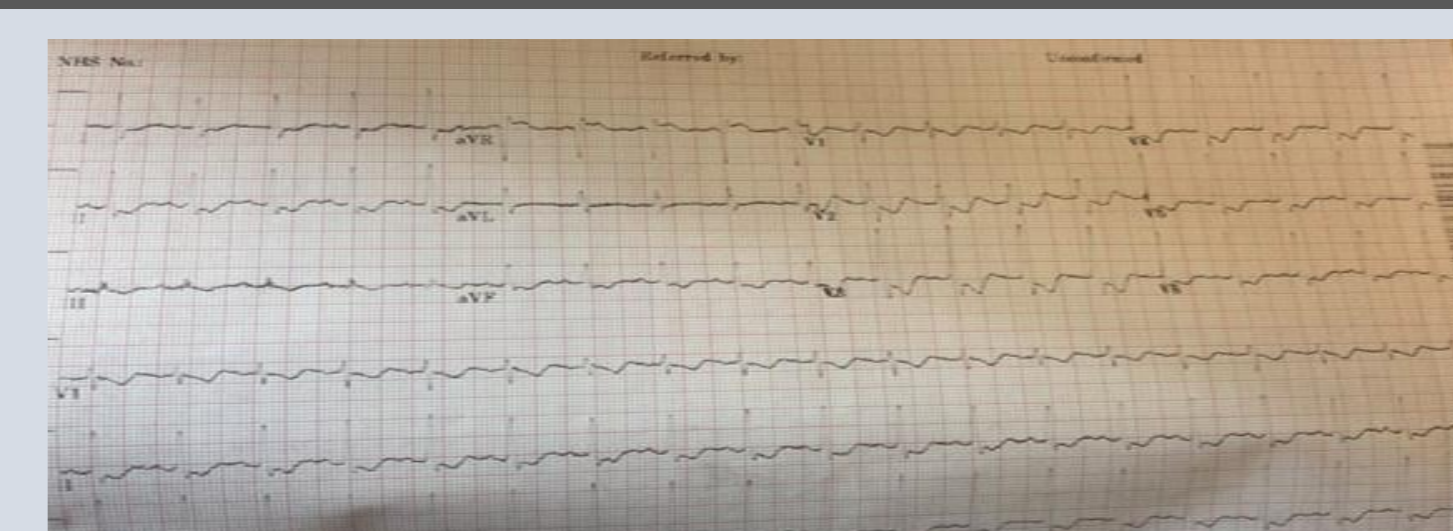
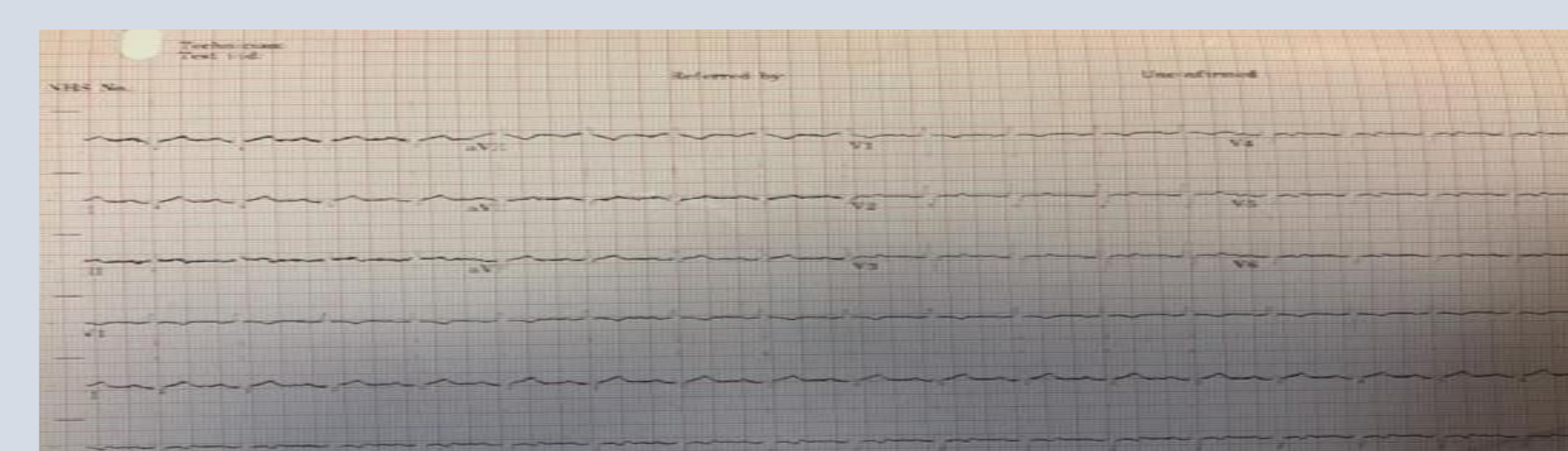


Figure:3



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:1.7mmol/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<3.5mmol, 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 1:Adrogue HJ,Leaderer ED,Suki WN,Eknayan G Determinants of plasma potassium in Diabetic ketoacidosis(Baltimore) 1986,65(3):163
Reference 2:Jang TB,Chauhan V,Morchi R,Najang H,Naunheim R,Kaji AH Intern Emerg Med 2015 Mar;10(2):177-80
Reference 3:Davis SM,Maddux AB,Alonso GT,Okada CR,Mourani PM,Maahs DM,Paediatric Diabetes 2014 Nov 27,Children's Hospital Colorado,Paediatric Endocrinology,University of Colorado, Aurora,CO,USA
Reference 4: Joint British Diabetes Societies Inpatient Care Group: The Management of Diabetic Ketoacidosis in Adults. 2013

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