

# Hypokalemia in Diabetic Ketoacidosis – A Case Report

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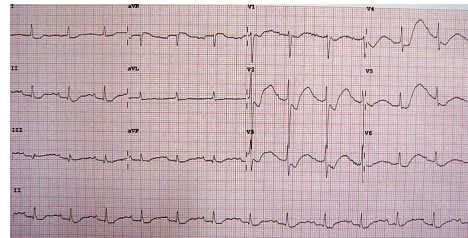
## BACKGROUND

- Diabetic Ketoacidosis in pregnancy is considered an obstetrical emergency.
- 0.5 to 10% of diabetic women will experience DKA during pregnancy.
- It is associated with increased rate of preterm delivery, perinatal morbidity and mortality with reports ranging from 9-35%. (1,2,3).
- Hypokalemia is common during the treatment of diabetic ketoacidosis (DKA), however, severe hypokalemia at presentation prior to insulin treatment is exceedingly uncommon.
- This case of a pregnant female presenting with Diabetic Keto Acidosis, has initial detection of hypokalemia prior to the insulin treatment. (4,5,6)
- The case contributes uniqueness to the medical literature because it has one of the rarest EKG finding of hypokalemia, the prominent U wave
- It is a great teaching and learning point during management of electrolytic imbalances and diabetic ketoacidosis.

## CASE HISTORY

- 28 -year-old female, G1P1A0 at 33 weeks period of gestation
- Past medical history of type 2 diabetes mellitus with skip of insulin for last 2 days, chronic hypertension and with multiple past admissions for diabetic ketoacidosis
- Presented to the Emergency Department with intractable nausea, vomiting, epigastric pain.

## EKG – classic hypokalemic changes



## PHYSICAL EXAM

Vitals were heart rate 116 per minute, respiratory rate 18, SpO2 100% on room air, blood pressure 114/79 in, temperature 97.6F.  
On physical exam, she was in mild distress, epigastric tenderness was present, uterus size 32 weeks

## INVESTIGATIONS

- EKG showed sinus tachycardia, ST segment depression, inverted T waves, large U-waves, slightly prolonged PR interval.
- CBC showed hemoglobin 10.6 and MCV 82.1.
- POC glucose more than 300, potassium 3.1, CO2 13, anion gap 19.
- She had moderate acetone level and urine protein: Creatinine ratio 516.
- venous blood gas analysis was significant of bicarbonate 13, oxygen saturation 93, pCO2 27.80, venous pH 7.31, PO2 83.
- Cardiac troponins were negative twice.

## MANAGEMENT

- NPO except for medications (anti-emetics, PPI and anti HTN medication.)
- Resuscitated with multiple boluses of ringer lactate, maintenance fluid, Dextrose 5% - Lactate Ringer with 20 milli equivalent KCL at 150 cc/hour.
- Insulin drip at 3 units per hour as per physician directed protocol, drip requirement went maximum up to 4 units per hour with an interval of hold due to low potassium 3.2 despite the KCL administration.
- Additional IV KCL was given, K level increased to 3.9.
- BMP monitor every 6 hours, frequent POC blood glucose checks.
- Insulin drip requirement went down to 1 Unit per hour. Bridging done with Insulin NPH 20 Units twice a day, Insulin Sliding Scale and Insulin Regular 5 Units thrice a day.
- After 18 hours of treatment, repeat lab work showed Anion Gap of 13, her POC glucose trended down within 140-180 mg/dl
- Hence the insulin drip was stopped. Rest treatment which included Insulin NPH, Insulin Regular and Sliding scale were continued.
- After 24 hours her vitals remained stable and within normal limits.
- Repeat EKG showed normal sinus rhythm with resolution of U waves and no new acute changes.
- Patient and the fetus were being closely monitored by Obstetrics/Gynecology team.

## DISCUSSION

- Hypokalemia is one of the most common electrolyte disturbances encountered during DKA.
- Hypokalemia is more evident in DKA during the insulin treatment due to intracellular shift of potassium, and, potentially, an aldosterone-like effect of insulin on the renal tubule that further increases urinary K losses.
- Serum K Level measured during DKA with severe acidosis highly masks the real total potassium deficit due to extracellular shift caused by the acute state of metabolic acidosis and chronic state of insulin deficiency in a diabetic patient.
- Hypokalemia leads to characteristic EKG changes- a Prominent U wave, which appears due to prolonged repolarization of ventricular Purkinje fibers. Prominent U waves are mostly seen in Lead V2 and V3, superimposed on T waves, giving it a classic appearance.

## CONCLUSION

- During DKA, a timely and adequate repletion of potassium is crucial. It should be managed without missing finest EKG findings during a hypokalemic episode.
- Holding off insulin therapy until Potassium level comes back within normal range is crucial to prevent complications like cardiac arrhythmia.