

## **CASE OF THE WEEK 11**

### **CLINICAL HISTORY:**

52 year old male, known case of type 1 diabetes mellitus on regular treatment with insulin since last 5 years presented with nausea, vomiting, polyuria and generalized weakness for the last two days. He suffered from a severe upper respiratory infection a week back and had received antibiotics for the same.

Routine medical examination 1 month back had revealed serum creatinine of 1.2 mg% (106 µmol/L) and 1+ urine protein on dipstick. He was advised 24 hours urinary protein estimation, but did not report for follow up.

### **EXAMINATION:**

Pedal edema +, BP 140/96 mm Hg, respiratory rate 36/ min

### **INVESTIGATIONS:**

Urine Albumin 2+, Sugar- present, RBC 3-4/hpf/hpf, WBC 6-8/hpf.

Haemoglobin 9.0 g% (90 g/L) , TLC 19,000/mm<sup>3</sup>, 89% Polymorphs, Platelets: adequate

Urea: 116 mg% (41.41 mmol/L), Creatinine 5.1 mg% (450.84 µ mol/L)

Blood glucose 459 mg% (24.36 m mol/L), Urinary ketones: Positive

ANA, anti-ds DNA, HBsAg/HCV/HIV: Negative

pANCA , cANCA: negative, Serum complement (C3 and C4) levels -Normal

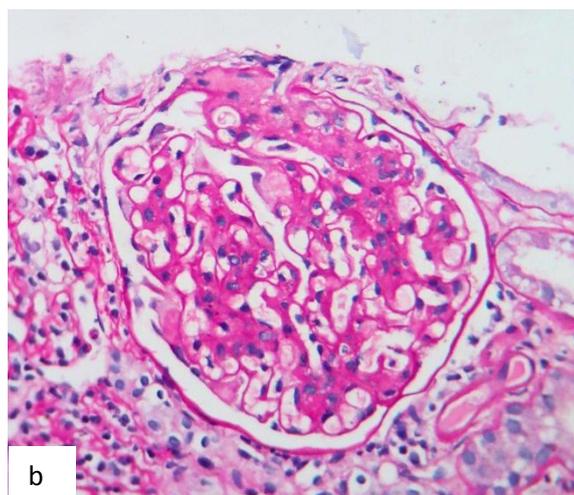
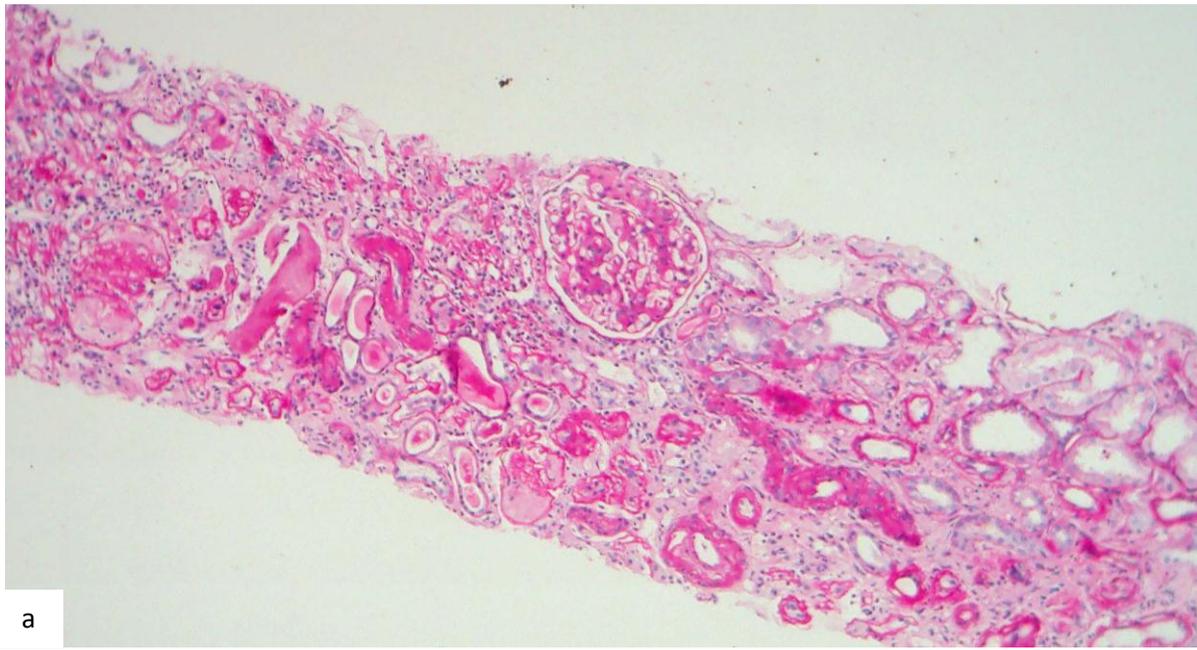
Arterial Blood Gas analysis: pH 7.2, serum bicarbonate : 12 mmol/l. Anion gap > 10

Serum electrophoresis-normal

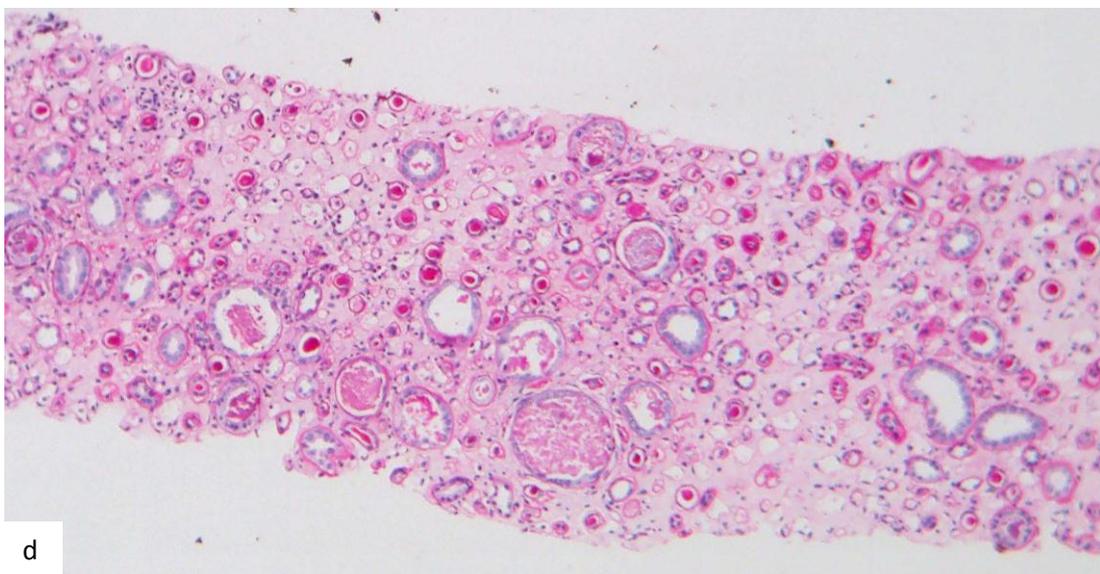
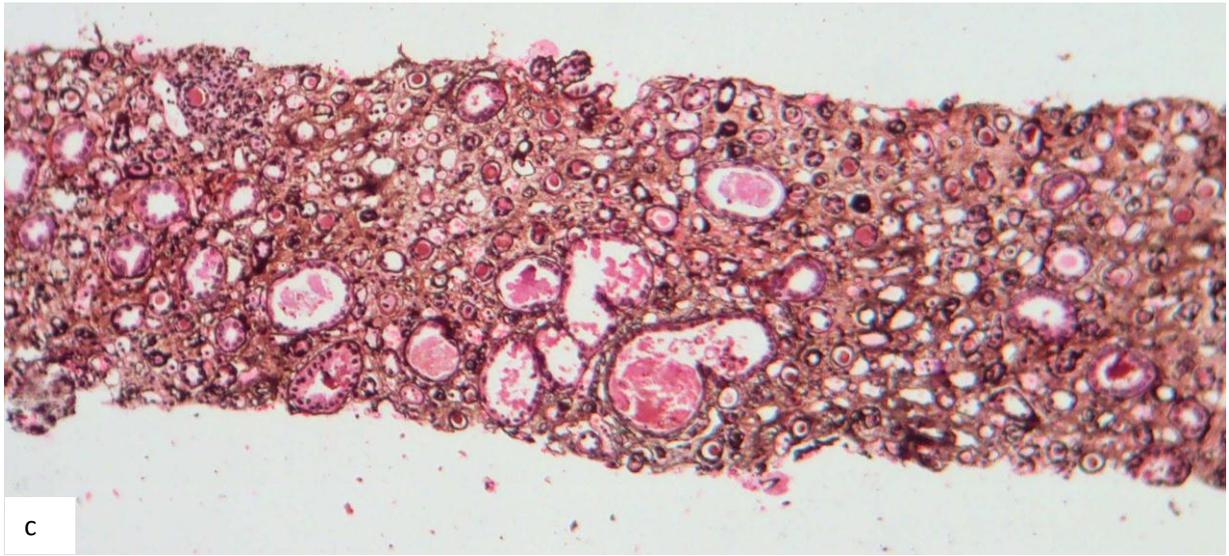
*Patient was stabilized, dehydration was corrected and i.v insulin infused. Metabolic abnormalities recovered over one week however azotemia persisted despite clinical improvement of ketoacidosis. A renal biopsy was thus performed to exclude non diabetic renal disease.*

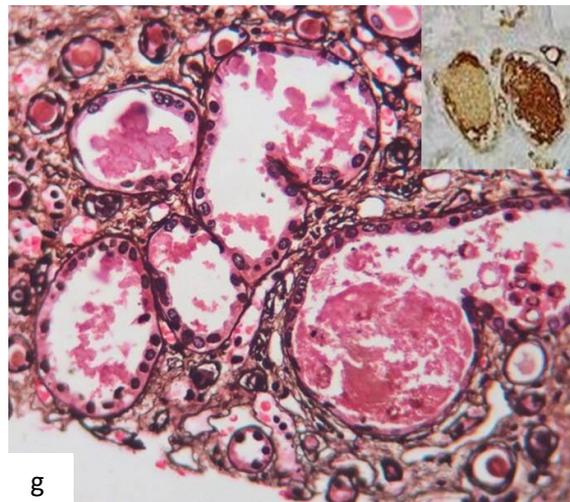
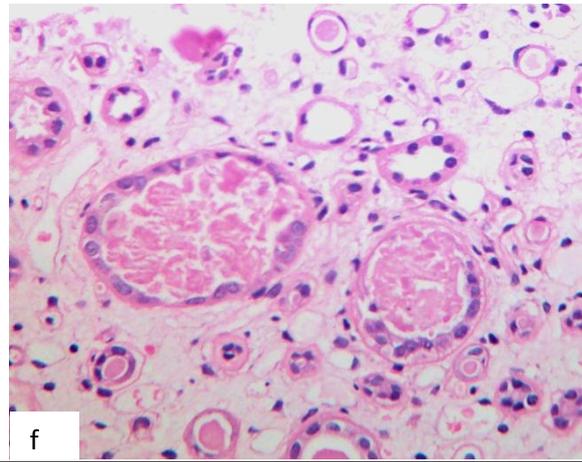
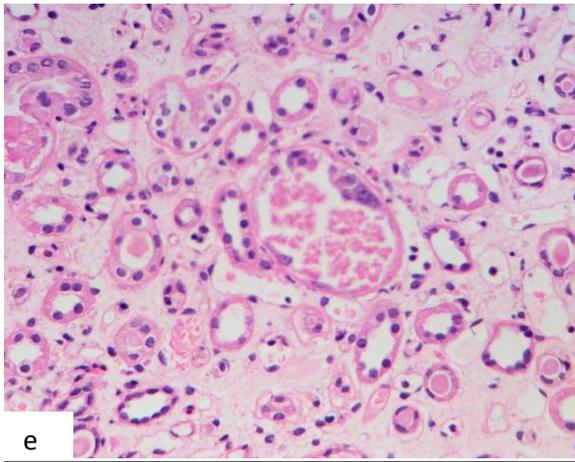
Representative images are provided. DIF studies were negative.

**MICROSCOPY:**



Biopsy revealed enlarged glomeruli with mesangial matrix expansion and occasional acellular intercapillary nodular areas with focal & segmental adhesions of capillary tufts to Bowman's capsule. Tubules contained inspissated hyaline casts and interstitium showed focal chronic inflammatory infiltrate. (Fig a &b)





Several distal tubular lumina contained variably sized casts with a coarse granular texture, admixed with few sloughed epithelial cells and inflammatory cells. Many atrophic tubules containing inspissated hyaline casts are also noted. Significant epithelial cell reaction to intratubular casts was not observed.(Fig c-f)

In view of clinical presentation, negative DIF studies and morphological appearance of tubular casts, suspicion of renal injury associated with inspissation of haemoglobin or myoglobin containing casts was raised. Perls stain for iron was negative. Urine showed no hemoglobinuria. There was no evidence of haemolysis in the peripheral smears and serum LDH was within normal limits. Serum Creatine Kinase (CK) levels were markedly elevated at

43,400 U/L (normal less than 170 U/L). Serum phosphate levels were 1.2 mg% (normal 3.0 - 4.5 mg %). IHC for myoglobin revealed positivity within the casts.(Fig g)

### **DIAGNOSIS:**

Acute worsening of renal functions (Acute kidney injury) due to inspissation of myoglobin casts in tubules induced by non-traumatic rhabdomyolysis in a patient with diabetic nephropathy (presenting in ketoacidosis).

### **DISCUSSION:**

The etiology of ARF associated with Diabetic Ketoacidosis (DKA) is multifactorial, most cases being secondary to hypervolemia and hypotension. Rhabdomyolysis is an important but often under recognized phenomenon in diabetics which can occasionally lead to severe renal injury. The rhabdomyolysis in diabetics is non-traumatic, in contrast to conditions where muscle injury is secondary to physical trauma. [1,2,3]

Pathogenesis of rhabdomyolysis in diabetes is multifactorial. Singhal *et al.* observed that serum sodium, serum osmolality and blood glucose were the major determinants for the occurrence of rhabdomyolysis in the diabetic state [4] while Gabow *et al.*[5] found hypokalemia and hypophosphatemia to be important predisposing factors for rhabdomyolysis. It is well known that prolonged ketoacidosis and insulin infusions can lead to severe hypophosphatemia [6,7,8] mainly due to intracellular phosphate shifting [9]. Hypophosphatemia leads to decreased intracellular concentration of ATP and 2,3 diphosphoglycerate (DPG), resulting in rhabdomyolysis. Hypophosphatemia also contributes

to the metabolic acidosis, which cannot be compensated by the renal production of ammonia due to lower urinary excretion of phosphate in the course of DKA [10]

#### REFERENCES:

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