Case Report

Hypokalemia Induced Rhabdomyolysis and AKI

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Abstract

Hypokalemia is common in clinical practice. But severe hypokalemia can cause rhabdomyolysis followed by AKI. Rhabdomyolysis is the breakdown of skeletal muscle fibers with leakage of muscle contents into circulation. Hypokalemia-induced rhabdomyolysis is a result of skeletal muscle hypoperfusion leading to ischemia. Acute kidney injury is a potential complication of severe rhabdomyolysis and it can be life-threatening.

Key words: *Hypokalemia, Rhabdomyolysis, Creatinine Phosphokinase.*

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Introduction

Hypokalemia is relatively much common in everyday clinical practice. But hypokalemia rarely causes rhabdomyolysis attributing to 14-28% of cases.[1] Rhabdomyolysis is a potentially life-threatening syndrome resulting from the breakdown of skeletal muscle fibers with leakage of muscle contents into the circulation.[2] It occurs in severe hypokalemia due to the diminished blood flow of muscle arterioles.[3,4] Rhabdomyolysis is usually associated with hyperkalemia due to renal failure and for that very reason, hypokalemia as a cause of rhabdomyolysis is usually missed.[5]

Case Presentation

A 36-year-old male, presented with the complaints of generalized weakness of all four limbs and limb pain for 3 days. He also complained of slurring of speech for same duration. He had no significant history of any past illness. He denied any history of vomiting, diarrhea, any previous episode of such illness, infection, trauma. He did not give any significant drug history. Physical examination revealed both lower limb and upper limb muscle power 2/5 bilaterally with diminished deep tendon reflexes. Plantar response was flexor bilaterally.

Table I: Investigations

Investigations	Results
Urine analysis	
pH	6.5
Glucose	Nil
Ketone	Nil
Complete blood count	
White blood cell	15000/cmm
Red blood cell	5.01million/cmm
Platelet	183000/cmm
Hemoglobin	13.8 gm/dl
Hematocrit	40 %
Serum electrolytes	
Sodium	135 mmol/L
Potassium	1.74 mmol/L
Chloride	109 mmol/L
Bicarbonate	17 mmol/L
Serum	
CPK	1092 IU/L
Uric acid	512 umol/L
Creatinine	349 umol/
Spot Urine electrolyte	
Potassium	18 mmol/day
ABG	

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Sensory system examination was normal. The laboratory examinations showed low serum potassium (1.74 mmol/L), low calcium (2.1 mmol/L),low bicarbonate (17.87 mmol/L) serum creatinine phosphokinase (CPK) level was 1092 IU/L, serum creatinine 349 umol/L and elevated Uric acid (512 umol/L) (Table I). Electrocardiogram (ECG) showed prolonged QT interval and U wave. Arterial blood gas (ABG) analysis revealed severe metabolic acidosis. Based on these clinical features, the diagnosis of hypokalemia and rhabdomyolysis was established. As we found metabolic acidosis in ABG along with hypokalemia we assumed it may be due to proximal renal tubular acidosis. After excluding other potential causes, to established the cause of RTA we took the occupational history of the patient. He told us he worked in a plastic factory where Lead is used. So it could be lead that was responsible for poximal RTA. Though we could not confirm this.

Patient was started on potassium supplement wit and adequate intravenous hydration. Renal function tests and urine output were monitored to see progression of acute kidney injury (AKI). Within 3 days patient's symptoms were alleviated and serum potassium and CPK levels normalized.

Discussion

Rhabdomyolysis is defined as a pathological condition of skeletal muscle cell damage leading to the release of toxic materials like CPK, myoglobin, alanine aminotransferase (ALT), aspartate amino transferase (AST), potassium.[6,7] Patients usually present with the symptoms muscle pain, weakness and reddish-brown urine.[8] Rhabdomyolysis is primarily caused by trauma, ischemia, drugs, toxins, metabolic disorders, infections and electrolyte disorders.[9] Severe hypokalemia is an important cause of muscle damage.[10] Local potassium levels in capillaries are important regulators for vascular tension. So, reduced potassium level causes constriction of the capillaries thereby reducing muscle blood supply and subsequently results in lysis of muscle cells and muscle cell damage.[3,4] Frank rhabdomyolysis usually occurs only when serum potassium level is below 2.0 mmol/L.[11] High index of suspicion is needed for the diagnosis of rhabdomyolysis. The gold standard for laboratory diagnosis is the determination of serum CPK level and as cut off threshold a concentration of 5 times the upper limit of the normal reference range (1,000 IU/L) is commonly used.[12] Simultaneous management of hypokalemia and rhabdomyolysis is crucial. Thorough cardiac monitoring along with potassium replacement is required. Aggressive hydration with monitoring of urine output and renal function is required to prevent renal failure of rhabdomyolysis. Offending drugs must be stopped if present.

Conclusion

Both hypokalemia and rhabdomyolysis can be life threatening. So early recognition and urgent management is required to limit complications.

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