Case Report

Rhabdomyolysis-Induced Acute Kidney Injury in Diabetic Emergency: Underdiagnosed and an Important Association to Be Aware of

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Rhabdomyolysis is a potentially life-threatening clinical syndrome associated with muscle injury which can cause a leakage of intracellular contents into the bloodstream. Rhabdomyolysis can manifest from the range of being asymptomatic to a life-threatening condition causing acute kidney injury and severe electrolyte abnormalities. Rhabdomyolysis has been associated with both diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic nonketotic syndrome, though there is an increased association with rhabdomyolysis and acute kidney injury with hyperosmolar nonketotic state compared with patients with diabetic ketoacidosis. Common clinical manifestations are muscle pain, dark urine, and generalized weakness. The causes of rhabdomyolysis are broadly categorized into three groups: traumatic, nontraumatic exertional, and nontraumatic nonexertional. Here, we present a case of rhabdomyolysis-induced acute kidney injury in a patient with hyperosmolar hyperglycemic state. The patient was discharged on insulin and needed intermittent dialysis for two months. Our case highlights the importance of the rare association of rhabdomyolysis causing acute kidney injury in a diabetic emergency.

1. Introduction

Rhabdomyolysis is a syndrome caused by muscle breakdown which releases intracellular contents into the blood stream. Rhabdomyolysis can manifest from the range of being asymptomatic to the range of being a life-threatening condition causing acute kidney injury and severe electrolyte abnormalities. Common clinical manifestations are muscle pain, dark urine, and generalized weakness. The causes of rhabdomyolysis are broadly categorized into three groups: traumatic, nontraumatic exertional, and nontraumatic nonexertional. Here, we present a case of rhabdomyolysis-induced acute renal failure in a patient with hyperosmolar hyperglycemic state.

2. Case Presentation

This is a 24-year-old autistic nonverbal male who was brought into the emergency room (ER) by his mother for increasing lethargy and frequent urination for a few days. Prior to admission, he had several episodes of nonbloody vomiting, but mother denies any history of fall, prolonged immobilization, medication overdose, and increased physical activities. On admission, the patient’s vitals were stable. Physical examination was significant for confusion, dehydration, and lethargy. Laboratory investigation in the emergency department revealed (Table 1) hypernatremia, highly elevated blood glucose level, elevated serum creatinine of 5.29 mg/dl (reference range 0.61–1.24 mg/dl),
Because of persistent poor renal function, progressively worsened and became anuric and was started on placement and DKA treatment. His renal function progressed to subcutaneous insulin and started on a diabetic protocol. After resolving of acidosis, the patient was transitioned to subcutaneous insulin and started on intermittent hemodialysis and developed chronic kidney disease stage 2 with a glomerular filtration rate of 80.

3. Discussion

Hyperosmolar state is an extremely rare cause of rhabdomyolysis. The causes of rhabdomyolysis are broadly categorized into three groups: traumatic, nontraumatic exertional, and nontraumatic nonexertional. Out of the three categories of rhabdomyolysis, our case belongs to the group of nontraumatic, nonexertional type. There has been a link associating diabetic emergencies and rhabdomyolysis [1, 2] and increased mortality rate. The link between rhabdomyolysis and diabetic emergencies is not well known, and that is why there is a potential to miss of the diagnosis of rhabdomyolysis.

In a study titled “Rhabdomyolysis in Diabetic Emergencies,” there were 44 cases of rhabdomyolysis out of 265 patients. The study showed that subclinical rhabdomyolysis in diabetic emergencies did occur more frequently than assumed [3, 4]. With minimal symptoms and clinical manifestations, the diagnosis can be missed. Our patient presented with the clinical manifestation of kidney failure. However, we had the additional challenge of our patient being mostly nonverbal, unable to express his complaints. This patient presented with new onset diabetes and hyperosmolar hyperglycemic state with severe dehydration. Initially, AKI was thought to be caused by dehydration due to hyperosmolar hyperglycemic state, and CPK was not checked initially. It is a great reminder for the clinician not to be limited to a single diagnosis and needs to consider other potential causes of acute kidney injury in diabetic emergencies when renal function did not improve in spite of having hemodialysis.

Even though rhabdomyolysis has been associated with both DKA and hyperosmolar hyperglycemic nonketotic syndrome, there is an increased association with rhabdomyolysis and acute kidney injury with hyperosmolar nonketonic state compared with patient with diabetic ketoacidosis. Although the exact mechanism of action of a hyperosmolar state causing rhabdomyolysis remains unclear, there have been theories postulating the etiology [5]. The high osmolarity can potentially cause the breakdown of the muscle cell wall [5, 6]. Also electrolyte abnormalities such as hypernatremia, hypokalemia, and hypophosphatemia seen in hyperosmolar hyperglycemia state also contribute to rhabdomyolysis [4, 7]. With intravenous insulin infusion in diabetic emergencies, there is a rapid shift of electrolytes from extracellular to intracellular. With insulin, there is a decrease in serum potassium and serum phosphate. Hypokalemia itself is a known metabolic cause of rhabdomyolysis [8].

In most cases of diabetic emergency, acute kidney injury usually presumed to be due to dehydration and diabetes
itself, and rhabdomyolysis remained underdiagnosed, which imposes potential consequences and increases mortality. Delayed diagnosis and treatment of rhabdomyolysis may lead to irreversible kidney damage progress to chronic kidney disease. With the patient’s history of autism, there was a missed opportunity for screening for an underlying myopathy, which could be revealed in acute transient rhabdomyolysis [9]. As a clinician, we should be more vigilant to look for this association and can prevent lifelong complications of renal failure.

4. Conclusion

Due to the high mortality rates associated with rhabdomyolysis and hyperosmolar hyperglycemic nonketotic syndrome, it is important to establish an early diagnosis. Routine screening by ordering CPK levels should be considered in patients admitted with diabetic emergencies. Acute kidney injury associated with rhabdomyolysis plays a role in the overall outcome of mortality. Rhabdomyolysis should be suspected in patients presenting with diabetic emergencies and acute kidney injury when common causes have been excluded and treated accordingly without improvement of kidney function.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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