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Rare Causes of Rhabdomyolysis; Rhabdomyolysis After Epileptic Seizure and Swimming

Rabdomiyolizin Nadir Sebepleri; Epileptik Nöbet ve Yüzmeden Sonra Rabdomiyoliz

ABSTRACT

Rhabdomyolysis is a condition of muscle tissue release including after necrosis of muscle due to a direct or indirect muscle injury. Rhabdomyolysis is mostly asymptomatic but hypovolemic shock, cardiac arrhythmias or acute renal failure may be seen afterwards. Herein, we presented two rare cases of rhabdomyolysis; a patient who developed acute kidney injury associated with rhabdomyolysis following an epileptic seizure and a patient who developed acute kidney injury associated with rhabdomyolysis following swimming. With these rare cases, we wanted to emphasize that epileptic seizures and excessive exercise such as swimming may cause rhabdomyolysis just like the well-known causes. Early treatment of rhabdomyolysis is very important and should be suspected if findings of rhabdomyolysis are seen after these events.

KEY WORDS: Rhabdomyolysis, Epileptic seizure, Swimming, Acute renal failure

ÖZ

Rabdomiyoliz, travmatik veya travmatik olmayan nedenlerle çizgili kasların akut nekrozu ve bunların dolaşıma salınması ile sonuçlanan durumdur. Klinik seyir asemptomatik olabilmekle birlikte miyopatiye, hayatı tehdit eden hipovolemik şoka, kardiyak aritmilere veya akut böbrek yetmezliğine neden olabilmektedir. Burada iki nadir rabdomiyoliz olgusunu sunduk; Epileptik nöbet sonrası rabdomiyoliz ile ilişkili akut böbrek yetmezliği gelişen bir hasta ve yüzmeyi takiben rabdomiyolizle ilişkili akut böbrek yetmezliği gelişen bir hasta. Bu nadir olgularla, epileptik nöbetlerin ve yüzme gibi aşırı egzersizlerin, iyi bilinen nedenler gibi rabdomiyolize neden olabileceğini vurgulamak istiyoruz. Rabdomiyolizin erken tedavisi çok önemlidir, bu olaylardan sonra rabdomiyoliz bulguları görülürse şüphelenilmelidir.

ANAHTAR SÖZCÜKLER: Rabdomiyoliz, Epileptik nöbet, Yüzme, Akut böbrek yetmezliği

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INTRODUCTION

Rhabdomyolysis is a condition of muscle tissue release including after necrosis of muscle due to a direct or indirect muscle injury. Rhabdomyolysis is mostly asymptomatic but hypovolemic shock, cardiac arrhythmias or acute renal failure may be seen afterwards (1-3). Herein, we presented two rare cases of rhabdomyolysis; a patient who developed acute kidney injury associated with rhabdomyolysis following an epileptic seizure and a patient who developed acute kidney injury associated with rhabdomyolysis following swimming.

CASE 1

A 30-month-old boy presented to our emergency department due to status epilepticus. He had no fever or trauma and he had no chronic dissease and he did not use any drugs or toxic substances. The electroencephalograph showed cerebral dysfunction of postictal period. Magnetic resonance imaging of the brain showed no abnormalities. His baseline creatinine was 1.8 mg/d and laboratory studies on the next day provided the following data: serum creatinine 4.34 mg/dL, BUN 24.9 mg/dL, LDH 2491 u/L, CK 38953 u/L (N=0- 145

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u/L), sodium 137 mEq/L, potassium 5.8 mEq/L, myoglobin 15375 µg/L (normal=0-76 µg/L). AST: 291 U/L, ALT: 57 U/L. He was managed with an antiepileptic drug and intravenous hydration with saline together with alkalinization of the urine was started. The next day laboratory studies were: creatinine 6.56 mg/dL, LDH 2491 u/L, and CK >175170 u/L. Arterial blood gas analysis revealed pH 7.38 and HCO_3 19.6, The urine was dark brown in color and showed no protein with 2-3 red blood cells (RBCs) per high power field.

Rhabdomyolysis due to seizure was considered and hemodialysis was started. After 4 weeks of follow-up with hemodialysis his CRE BUN ratio levels became normal and follow-up continued without hemodialysis.

CASE 2

A 29-year-old man presented to the emergency department with complaints of sudden onset of headache, dizziness and muscle pain and dark urine color. The patient had been swimming at a swimming competition the same day and his symptoms had started one hour after swimming. There was no history of fever, trauma or drug or toxic substance use.

He routinely exercised twice weekly. He neither smoked nor consumed alcohol or other substances. He was also not on any alternative or traditional treatment. He had no specific family history of chronic diseases. On physical examination, blood pressure was 120/70 mmHg and temperature was 36.4°C. The heart rate was 89 beats per minute and the respiratory rate 22 per minute. Musculoskeletal examination revealed generalized muscle tenderness but muscle power was preserved and he had no neurological deficit. The rest of the physical examination was normal. Laboratory studies on admission provided the following data; hemoglobin 14.2 g/dL, white blood cells 8.900 /mm^3, platelets 213000/uL, serum creatinine 3.9 mg/dL, BUN 38 mg/dL, uric acid 7.9 mg/ dL, LDH 751 u/L, CK 8879 u/L (normal=0-145 u/L), sodium 139 mEq/L, potassium 4.72 mEq/L, myoglobin 5375 µg/L. Arterial blood gas analysis revealed pH 7.39, HCO_3 20.6 mEq/L. The urine was dark brown in color, and contained no protein with 1 red blood cells (RBC) per high power field but no casts. Electrocardiogram showed normal spontaneous heart rate and no other significant findings. The reason of the acute renal failure was thought to be swimming-induced rhabdomyolysis. The patient was hospitalized and hydrated and urine alkalinization was started. On follow-up 1 week later, his serum creatinine level was 1.13 mg/dl, the CK level had decreased to 130U/L and the CK-MB value was normal. His LDH had also decreased to 415 U/L. During the follow-up, the patient was asymptomatic after two weeks and his serum creatinine, CK and myoglobin levels were at normal levels.

DISCUSSION

Rhabdomyolysis is a condition of released muscle tissue such as after necrosis of muscle due to a direct or indirect muscle injury. The etiology includes crush injuries, excessive muscle activity, hypo-hyperthermia, seizures, alcoholism, intoxications, and electrolyte imbalance (2-4).

Complications of rhabdomyolysis may occur at the early and late stage of various disorders. Early complications occur in the first 12 hours and consist of hyperkalemia, hypocalcemia, hepatic inflammation, cardiac dysrhythmia, and cardiac arrest. Late complications occur after 12-24 hours. They are disseminated intravascular coagulation, and acute renal injury (3,5). The most common and lethal complication of rhabdomyoloysis is AKI and an estimated 10%-40% of patients with rhabdomyolysis develop acute renal failure, and up to 15% of all cases of AKI can be attributed to rhabdomyolysis (4).

Although major trauma is a well-known cause of rhabdomyolysis that results in acute renal failure, non-traumatic rhabdomyolysis may occur following generalized convulsions and excessive muscular activity. In this article, we report two rare causes of rhabdomyolysis; a patient who developed AKI associated with rhabdomyolysis following a seizure and a patient who developed AKI associated with rhabdomyolysis following swimming.

Rhabdomyolysis developing after exertion is the result of skeletal muscle trauma that generally appears after heavy exercise in a hot and moist environment. Generally it is observed in marathon runners and military personnel. There are also some risk factors associated with rhabdomyolysis after exercise. The prevalence of sickle cell trait, which may lead to an exaggerated increase in post exercise creatine kinase (CPK), may be a risk factor. Drugs, particularly amphetamines cause peripheral vasoconstriction and may hamper bodily heat release and may facilitate rhabdomyolysis. If rhabdomyolysis is recurrent in a healthy, young patient, inherited muscle enzyme defects such as carnitine palmitoyltransferase deficiency, myophosphorylase deficiency (McArdle's disease) and adenosine monophosphate deaminase deficiency should be considered (3,4,6,7).

AKI due to rhabdomyolysis following a seizure is a rare event. In our literature survey, rhabdomyolysis due to seizure occurred mostly with repeated seizures and also dehydration of the patient was seen in the reports. Muscle trauma due to falling or muscle injury by muscle forces generated during tonic-clonic seizures may also cause rhabdomyolysis (8-13).

High CPK levels are important in the diagnosis of rhabdomyolysis. The classification of CPK elevation is mild for less than 10 times the upper limit of normal (or 2,000 IU/L), moderate for 10 to 50 times the upper limit of normal (or 2,000 to 10,000 IU/L), and severe for greater than 50 times the upper limit of normal (or greater than 10,000 IU/L). A CPK level above 5,000 to 6,000 IU/L increases the risk of acute renal failure. (9). Other laboratory findings of rhabdomyolysis are increased serum levels of lactate dehydrogenase, myoglobin, aspartate-alanine aminotransferase, aldolase, carbonic anhydrse,

phosphate and potassium, and decrease of serum calcium levels. Darker urine, blood in the urine but no urinary electrolyte disorder, and myoglobinuria can also be observed (3,5).

Clinically, the condition can present with generalized muscle weakness, skin color difference at the affected side, increased body temperature and generalized or local muscle pain, especially at the hip and upper leg, tachycardia, nausea and vomiting. The management of AKI due to rhabdomyolysis requires early renal replacement therapy. Intense rehydration as soon as possible and forced alkaline diuresis are also an integral part of the management. In some cases, hemodialysis must be done if needed (3,14,15).

CONCLUSION

By presenting these rare cases, we wanted to emphasize that seizures and excessive exercise such as swimming may cause rhabdomyolysis just like the well-known causes. Early management of rhabdomyolysis is very important so we have to be suspicious if signs of rhabdomyolysis is seen after these events. Patients with severe, generalized and repeated seizures should be monitored closely in terms of the development of rhabdomyolysis and acute kidney injury. If a patient presents with muscle stiffness, swelling, pain and fatigue after heavy exercise, the possibility of rhabdomyolysis development should always be taken into account.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article is reported.

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