

Rhabdomyolysis following exercise: a case report

Nuran CELENK¹, Servet U. CELENK², Ali GÜNEŞ³

¹ Department of Pediatrics, Kirsehir Education and Research Hospital, Kirsehir, Turkiye.

² Neset Ertas Family Health Center, Kirsehir, Turkiye.

³ Department of Pediatrics, Faculty of Medicine, Ahi Evran University, Kirsehir, Turkiye.

SUMMARY

Rhabdomyolysis is an acute progressing disorder that may cause acute kidney injury due to the release of muscle breakdown products into the bloodstream. Muscle breakdown caused by multiple trauma, crush injury, infection, drugs, or epilepsy can lead to rhabdomyolysis. A delayed diagnosis or treatment may result in adverse outcomes and even death. This study aimed to present a case of rhabdomyolysis following intense exercise.

Key words: Exercise, high enzymes, rhabdomyolysis

INTRODUCTION

TRhabdomyolysis is a disorder characterized by muscle breakdown. It can be easily diagnosed with a careful medical history taking and medical workup. A delay in diagnosis may lead to acute kidney failure with a ratio of 10:60 (1). Rhabdomyolysis induced by intense exercise occurs in 24–48 h following the exercise. People engaged in sport activities that may cause destruction in major muscle groups, such as long-distance running, bodybuilding and weightlifting, are at risk. Myoglobin, which is released by necrotic muscles and has a direct toxic effect on renal tubules, can cause acute kidney injury with dehydration (2). Patients usually present with generalized myalgia, malaise, and darkening of urine color. An increase in the activity of muscle enzymes [creatinine phosphokinase, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and lactate dehydrogenase], myoglobinuria and myoglobinemia, electrolyte imbalance, change in pH value, and increase in urea and creatinine may be observed in laboratory tests (3, 4). Treatment should include proper fluid replacement, monitoring of fluid intake and output, and urine alkalization (3).

CASE REPORT

A 17-year-old male patient presented to the emergency service with a pain in the arms and malaise, which started 2 days ago. The patient who had no significant medical history stated that he did bodybuilding 2 h daily for 1 week. He was conscious, cooperative, and oriented during the examination. His vital signs were stable. His blood pressure was 100/65 mm Hg, and his body temperature was 36.7°C. During his physical examination, he reported pain in his both arms. No signs of hepatomegaly or splenomegaly were reported. His laboratory workup was as follows: serum creatinine kinase (CK) 54,000 U/L (normal: 7–190), ALT 215 U/L (normal: 5–40), and AST 1004 U/L (normal: 8–40). His urine workup revealed no significant findings, and urine pH was 7.0. No significant difference was observed in his troponin and CK-MB levels. No significant change was found in serological markers. The patient was admitted to the hospital. Intravenous infusion treatment of 40 mEq/day sodium bicarbonate and isotonic sodium chloride was administered so that his urine pH was less than 6.5. His fluid intake and output were monitored. Hemoculture and urine culture were sampled to exclude infectious causes and reported as sterile. Neurology consultation indicated no muscular disease. Bicarbonate treatment was stopped on the fourth day of his admission. Fluid replacement treatment was continued. The patient had no obvious complications on the seventh

Correspondence:

Nuran CELENK

Kirsehir Eğitim ve Araştırma Hastanesi Çocuk Sağlığı ve Hastalıkları Kliniği 40100 Kirsehir, Türkiye

e-mail: nurandursun@yahoo.com

day of his admission. Therefore, he was discharged with a cure after his CK level decreased to 316 U/L and AST and ALT levels decreased to two times above of the normal range.

DISCUSSION

Rhabdomyolysis is a disorder characterized by the release of cell contents into the bloodstream after muscle breakdown (4). It was first described by Felisher in 1881 as detection of hemoglobin in urine after exercise (5). Its etiology includes many causes such as traumatic causes (crush syndrome), extended immobilization especially following orthopedic procedures, new-onset intense exercise programs, drugs, hyperthermia, muscle disorders, and infections (6). The clinical picture of the patient might extend from a simple increase in enzyme levels with no symptoms of kidney failure and even disseminated intravascular coagulation (7).

In this study, the patient presented with a clinical picture of rhabdomyolysis because he did intense exercises and it became an ongoing situation although he had no habit of doing exercises earlier. His admission to the hospital before kidney failure, a good medical history taking, examination, and rational workups made the diagnosis easy. Proper fluid treatment and renoprotective treatment planning at an early stage are the factors that ensured cure and discharge of the patient.

The most important laboratory finding of rhabdomyolysis is an increase in serum myoglobin level (8). The increase in serum myoglobin levels in this case was not detected because of late admission to the hospital, short half-life of myoglobin (1–3 h), and its total clearance from blood after approximately 6 h.

Another important laboratory finding of rhabdomyolysis is an increase in the levels of muscle enzymes. CK, AST, and ALT levels increased in this case. Especially, massive increase and dramatic decrease in CK levels following treatment were typical. Although no cut-off value was identified for CK levels in the diagnosis of rhabdomyolysis, it is suggested that CK levels should be more than 10 times (1). Also, no value was identified in terms of the correlation between CK increase and acute kidney failure following intense exercise (5). Although a high level of CK was observed in the patient in this study, no kidney failure was identified. Previous studies investigated a relation between CK increase and acute kidney failure following exercise and tried to identify a cut-off value, but they were not successful (9).

Rhabdomyolysis and subsequent acute kidney failure should be treated with early and proper fluid replacement, maintenance of urine alkalization, and forced diuresis (10). A significant reduction in progression to acute kidney failure is suggested with proper and adequate treatment (4). Treatment at an early stage of the disease was an important factor for positive treatment response and no complication development in this study.

In conclusion, it is recommended to consider rhabdomyolysis in patients presenting with complaints of muscle pain, muscle weakness, and darkening of urine color following intense exercise. Fluid replacement treatment should be administered and muscle enzymes and kidney function parameters should be monitored closely immediately after admission to the hospital.

REFERENCES

1. Zimmerman JL, Shen MC. Rhabdomyolysis. *Chest*. 2013;144:1058-65.
2. Sayers SP, Clarkson PM: Exercise induced rhabdomyolysis. *Curr Sports Med Rep* 2002, 1:59-60
3. Shani Y, Heled Y, Moran DS: Exercise rhabdomyolysis. *Aviat Space Environ Med* 2001, 72:856
4. Kocer M, Karakisa H, Avci A, Satar S. Rhabdomyolysis. *Archives Medical Review Journal*. 2016; 25(4): 586-607
5. Counselman FL: Rhabdomyolysis. In: Tintinalli JE ed. *Emergency Medicine a Comprehensive Study Guide* 5th Ed. North Carolina : McGraw-Hill, 2000; 1841-5
6. Torres PA, Helmstetter JA, Kaye AM, Kaye AD: Rhabdomyolysis: Pathogenesis, diagnosis, and treatment. *Ochsner J* 2015;15:58-69
7. Huerta-Alardín AL, Varon J, Marik PE. Bench-to bedside review: Rhabdomyolysis -- an overview for clinicians. *Crit Care* 2005;9:158-69.
8. Furuncuoglu Y, Ecder T, Yıldız A, Türkmen A. Nontravmatik rabdomyolize bağlı bir akut böbrek yetersizliği olgusu. *İst Tıp Fak Derg* 2014;77-3:48-50.
9. Clarkson PM, Kearns AK, Rouzier P, Rubin R, Thompson PD: Serum creatine kinase levels and renal function measures in exertional muscle damage. *Med Sci Sports Exerc* 2006; 38:623-7
10. Khan FY. Rhabdomyolysis: a review of the literature. *Neth J Med* 2009; 67: 272-283.