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Case Report

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건축노동과 스트레스성 운동에 의한 횡문근융해증상을 악화시키는 감기약: 증례보고

윤현옥[1] · 장윤진[1] · 박시내[1] · 최은주[2] · 김수완[3]*

[1] 경상대학교 약학대학 및 약학연구소, [2] 조선대학교 약학대학, [3] 전남대학교 의학전문대학원 및 전남대학교병원 신장내과
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Cold Medications Aggravated Rhabdomyolysis Symptoms Induced by Building Construction Work and Strenuous Exercise: a Case Report

Hyonok Yoon[1], Yoon Jin Jang[1], Si Nae Park[1], Eun Joo Choi[2], and Soo Wan Kim[3]*

[1]College of Pharmacy, Research Institute of Pharmaceutical Science, Gyeongsang National University, Gyeongnam 52828, Republic of Korea
[2]College of Pharmacy, Chosun University, Gwangju 61452, Republic of Korea
[3]Division of Nephrology, Department of Internal Medicine, Chonnam National University Hospital and Medical School of Chonnam National University, Gwangju 61469, Republic of Korea
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ABSTRACT

Summary: A 21–year–old healthy Korean man worked on a building construction site every day for almost 2 months and exercised every day for 1 or 2 hours after working hard. He felt dizziness, nausea, and experienced vomiting and body aches immediately after exercise and immediately took cold medicines including acetaminophen, cimetidine, bepotastine, and Codenal? complex for the common cold symptoms for 2 days because he was scheduled to participate in navy training at that time. He complained of severe trapezius pain and aches in his left calf 3 days after joining the Navy training. Testing revealed creatine phosphokinase (CPK) 6260 U/L, myogloblin 176 mcg/L in the urine, liver enzymes increased, and oliguria, suggesting rhabdomyolysis. He recovered with intravenous fluids without any complications.

KEY WORDS: Rhabdomyolysis, creatine phosphokinase (CPK), myogloblin, building construction work, exercise, cold medicines

INTRODUCTION

Rhabdomyolysis is a condition in which the muscle cells are rapidly damaged quickly and skeletal muscle cell necrosis is induced. Skeletal muscle cell death is associated with the production of reactive oxygen species, mitochondrial dysfunction and elevated skeletal muscle cell contractility as a result of the activation of muscle enzymes caused by increased intracellular free ionized cytoplasmic and mitochondrial calcium.[1,2] The pathway of muscle cell death is also associated with depletion of adenosine triphosphate (ATP) which causes myocyte injury and the production of intracellular muscle constituents such as various electrolytes, myoglobin, and creatine kinase (CK) which also known as creatine phosphokinase (CPK) which is the hallmark of rhabdomyolysis.[1,2)]

The protein myoglobin, one of the muscle constituents produced from damaged muscle tissues or cells, is released into the blood and leads to acute kidney injury in severe cases due to myoglobinuria and also features increased CPK. Myoglobin, a heme-containing respiratory protein, is not especially protein-bound due to a monomer and is quickly excreted in the urine in a red to brown color when it exceeds about 100 ml/dL.[3)]

The symptoms of rhabdomyolysis vary according to serum

*Correspondence to: Soo Wan Kim, Division of Nephrology, Department of Internal Medicine, Chonnam National University Hospital and Medical School of Chonnam National University, 42 Jebongro, Donggu, Gwangju 61469, Republic of Korea
Tel: +82-62-220-6271, Fax: +82-62-225-8578
E-mail: skimw@jnu.ac.kr

muscle enzymes elevations and range from little or no symptoms to life threatening conditions related to electrolyte disorders and acute kidney injury. Muscle ache, vomiting, and disorientation are common symptoms of rhabdomyolysis. The most reliable test for the diagnosis of rhabdomyolysis is the enzyme level of CPK and someone is diagnosed with rhabdomyolysis if their CPK level is above 5 folds the normal upper limit in the blood.

In this case it reports that cold medications may exacerbate initial rhabdomyolysis symptoms such as nausea, vomiting and myalgia that have been induced by strenuous physical activity or exercise.

CASE REPORT

A healthy 21-year old man worked, who had no medical history with unknown family history and concomitant medications, four days per week for 2 months on a building construction site and exercised at gym for 1 and 1/2 hours every day after working. He felt dizziness, nausea, and experienced vomiting and body aches immediately after exercising at the gym. He thought he might have gotten a cold because he also had a cough. He was prescribed medicine for two days after visiting a local clinic. Then, he participated in navy training the day after he was prescribed the medication.

His prescription drugs were acetaminophen 325 mg PO TID, cimetidine 200 mg PO TID, bepotastine 10 mg PO BID for allergic rhinitis, codenal complex (chlorpheniramine maleate 1.5 mg, dihydrocodeine bitartrate 5 mg, dl-methylephedrine hydrochloride 17.5 mg, guaifenesin 50 mg) 1 tablet of PO TID for coughing and sputum. These were administered for 2 days before his entry into military service. He had an allergic reaction to shrimp but there was no family history of rhabdomyolysis.

He complained of severe trapezius pain and aches in the left calf 3 days after being inducted into the Navy in the spring season. His height was 182.3 cm and his weight was 78.7 kg. He was alert and afebrile. After undergoing tests, his laboratory data revealed the following: CPK 6260 U/L, aspartate aminotransferase (AST) / alanine aminotransferase (ALT) 150/134 U/L. The lactate dehydrogenase was (LDH) 498 IU/L on the first day (LDH data not shown). On the next day, the following were measured: CPK 6587 U/L, AST/ALT 139/119 U/L, myogloblin 176 mcg/L in urine, phosphorus 4.9 mg/dL, and oliguria, suggesting significant rhabdomyolysis (Fig. 1). Although other electrolytes levels were in the normal range, potassium and serum creatinine levels reached near the upper limit of the normal range in the initial stage. Kidney ultrasonography showed that the size of the right kidney was bigger (12.0 cm × 5.51 cm) than the left kidney (11.5 cm × 4.78 cm), kidney cortex thickness was 0.883 mm, and the space-occupying lesion and cyst differentiation of renal medullar/cortex were moderate.

He was given a normal saline 44 mL/hour intravenous injection from the first day of administration for several days followed by 80 mL/hour infusion and placed in intensive care. Finally, his CPK, AST, ALT, myoglobinuria and urine output were in the normal ranges (Fig. 1). The LDH also recovered in the normal value range (268 IU/L). 3-Phase Bone Scan [Tc-99m hydroxymethane diphosphonate 740 MBq (20 mCi) intravenous injection] indicated that he showed no signs of increase in perfusion, hyperemia or muscular uptake and so was discharged from hospital.

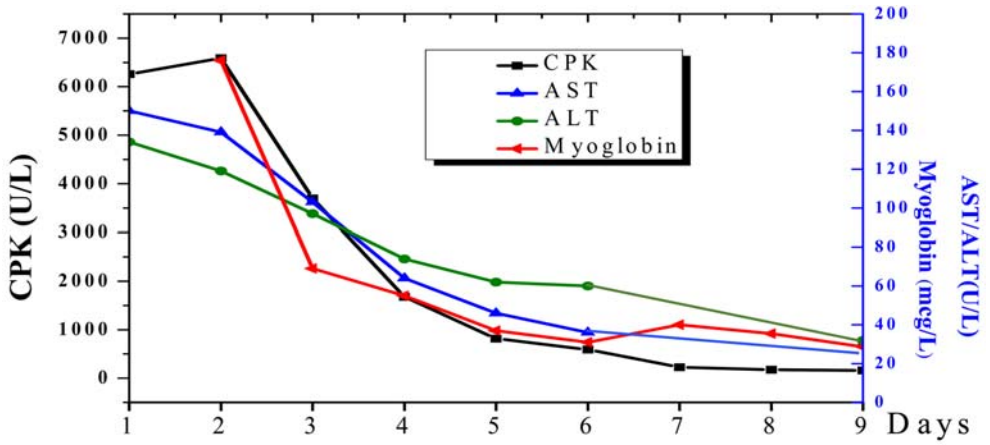

Fig. 1. The laboratory data on administered days.
CPK: creatine phosphokinase, AST: aspartate aminotransferase ALT: alanine aminotransferase

DISCUSSION

Rhabdomyolysis can be caused by many factors such as extreme physical exercises,[4] especially when dehydrated metabolic disorders occur,[5] abnormal body temperature,[6] infection,[7,8] inflammation or drugs and toxins[9] such as statins, antipsychotics, neuromuscular blocking agents, selective serotonin reuptake inhibitors, heavy metals or poison.

In the case of this young man, rhabdomyolysis may be related to multiple sequence events such as hard work on a building construction site, regular fitness training, the taking of several kinds of medications, and navy training over the course of a few days. His continuous hard work and exercise first triggered the rhabdomyolysis symptoms. He did not realize there was a muscle problem when he first experienced dizziness, nausea and vomiting then he took some medications for the cold drugs because his symptoms were similar to those of the common cold.

However, the prescribed medications and navy training might have exacerbated the rhabdomyolysis triggered by the building construction work and strenuous exercise. Specially, the shortly administered acetaminophen and codenal complex might increase ALT/AST levels and boost rhabdomyolysis.[10] Actually, small amount of acetaminophen including cold medications could not induce rhabdomyolysis but large doses of these could cause rhabdomyolysis.[11,12] In this case, although no drug-drug interaction was found because the shorter usage of cimetidine could not impact on the other drug metabolism,[13] the approximate 1,000 mg of acetaminophen per day and cold medication caused the promotion of higher AST/ALT levels than the previously reported AST/ALT levels.[14] In addition, the score recorded on the council for international organizations of medical sciences (CIOMS) scale was 4, which means a possible relationship between drugs and liver problems.

This interesting case of rhabdomyolysis was definitely brought on by a combination of heavy work and strenuous exercise and this condition was exacerbated by cold medications and the physical training done after joining the navy. However, navy training might not have directly induced rhabdomyolysis. For those who experience nausea, vomiting, weakness and muscle aches after hard physical work, CPK and myoglobinuria should be considered as ways to check and monitored for rhabdomyolysis before any medications are administered when cold symptoms occur.

IRB: This study was performed with the consent of the patient and IRB was approved by Gyeongsang National University (IRB #: GIRB-G15-X-0053).

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REFERENENCES

1. Giannoglou GD, Chatzizisis YS, Misirli G. The syndrome of rhabdomyolysis: Pathophysiology and diagnosis. Eur J Intern Med 2007; 18(2):90-100.
2. Khan FY. Rhabdomyolysis: a review of the literature. Neth J Med 2009;67(9):272-83.
3. Bosch X, Poch E, Grau JM. Rhabdomyolysis and acute kidney injury. N Engl J Med 2009;361(1):62-72.
4. Olerud JE, Homer LD, Carroll HW. Incidence of acute exertional rhabdomyolysis. Serum myoglobin and enzyme levels as indicators of muscle injury. Arch Intern Med 1976;136(6):692-7.
5. Shintani S, Shiigai T, Tsukagoshi H. Marked hypokalemic rhabdomyolysis with myoglobinuria due to diuretic treatment. Eur Neurol 1991; 31(6):396-8.
6. Bonnor R, Siddiqui M, Ahuja TS. Rhabdomyolysis associated with near-drowning. Am J Med Sci 1999;318(3):201-2.
7. Blanco JR, Zabalza M, Salcedo J, Echeverria L, Garcia A, Vallejo M. Rhabdomyolysis of infectious and noninfectious causes. South Med J 2002;95(5):542-4.
8. Pesik NT, Otten EJ. Severe rhabdomyolysis following a viral illness: a case report and review of the literature. J Emerg Med 1996;14(4):425-8.
9. Melli G, Chaudhry V, Cornblath DR. Rhabdomyolysis: an evaluation of 475 hospitalized patients. Medicine (Baltimore) 2005;84(6):377-85.
10. Moneret-Vautrin DA, Morisset M, Humbert JC, *et al*. Acetaminophen-induced rhabdomyolysis. Allergy 1999; 54(10):1115-6.
11. Yang CC, Deng JF, Lin TJ. Pancytopenia, hyperglycemia, shock, coma, rhabdomyolysis, and pancreatitis associated with acetaminophen poisoning. Vet Hum Toxicol 2001;43(6):344-8.
12. Tsang JS, Au WY. Cough mixture abuse and rhabdomyolysis. Hong Kong Med J 2012;18(1):68-9.
13. Vendemiale G, Altomare E, Trizio T, *et al*. Effect of acute and chronic cimetidine administration on acetaminophen metabolism in humans. Am J Gastroenterol 1987;82(10):1031-4.
14. Kim KG, Kim JH, Kim SM, *et al*. Clinical study of rhabdomyolysis developed after the training. Korean J Intern Med 2002;63(6):675-81.