Exertional Rhabdomyolysis Following Excessive Exercise of University Freshman Cheer-Training

AJANEE MAHAKKANUKRAUH, MD*,
APICHAT SANGCHAN, MD*,
PIROON MOOTSIKAPUN, MD*

Abstract

Exertional rhabdomyolysis is a life threatening condition resulting from lysis of muscle cells after vigorous exercise. It can cause many complications such as renal failure. It occurs most commonly in military personnel but also in civilians who have excessive excercise after work. Two cases of freshmen who had exertional rhabdomyolysis were reported to illustrate the potential risk of cheer-training. Appropriate measures should be arranged to prevent this condition. Diagnosis and treatment should be given promptly to prevent serious complications.

Key word : Exertional Rhabdomyolysis, Rhabdomyolysis, Cheer-training

**MAHAKKANUKRAUH A,
SANGCHAN A, MOOTSIKAPUN P
J Med Assoc Thai 2003; 86: 789-792**

Rhabdomyolysis due to the extremes of physical exertion is thoroughly described especially in military training, marathon running[1-7] as well as conditioned athletes[8]. It also occurs in civilians who have over-exercise after work such as businessman, attorneys and medical student[9]. Rhabdomyolysis can result in many potentially serious complications such as acute renal failure and cardiac arrest[4,6,9]. The authors present two cases of rhabdomyolysis, which occurred in healthy freshmen according to forced repetitive muscle overexertion during university freshman cheer-training. Prevention and monitoring of this condition should be considered during cheer training.

* Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.

CASE REPORTS

Two 18 year-old males who were first year freshmen of the same faculty were admitted to Srinagarind Hospital in June 2000 with a two-day history of dark urine and painful swollen legs and back pain. They had been forced to do 100 repetitive stand up and deep knee bends two days before during a cheer-training day. They also had little fluid intake during more than 12 hours. They denied alcohol abuse. They were previously healthy.

On physical examination they appeared to be normal young men. Their blood pressures were normal and they were afebrile. Both had tenderness and swelling of both calves. Their admission laboratory data are shown in Table 1.

Rhabdomyolysis associated with overexertion was diagnosed. Vigorous fluid resuscitation and alkalinization was begun. They were non-oliguric. Their muscle tenderness decreased and the creatinine kinase level declined. They were discharged after 2-3 days of close observation.

They came for a follow-up visit a week later. They appeared normal and had no muscle tenderness. Their creatinine kinase levels were also within normal limits.

Table 1. Admission laboratory data of 2 cases of exertional rhabdomyolysis in this study.

	Case 1	Case 2
WBC	16,600	8,900
Urinalysis		
Specific gravity	1.013	1.022
Protein	Trace	2+
Blood	3+	3+
RBC	1-2	0
Blood chemistry		
BUN	9.0	5.3
Creatinine	0.9	0.8
Potassium	4.4	3.6
AST	1,585	1,046
Creatiine kinase	78,066	76,817

DISCUSSION

Rhabdomyolysis is a well recognized syndrome resulting from an injury to skeletal muscle cells that allows intracellular contents leak into the circulation such as myoglobin, creatine kinase (CK), lactate dehydrogenase (LDH), aspartate aminotransferase (AST), alanine aminotransferase (ALT)[10]. Subsequent myoglobinuria may be found. An elevated serum creatine kinase and myoglobulinuria should confirm the diagnosis. Although assays for myoglobulinuria are not widely available, urine dipstick positive for blood without microscopic hematuria may be useful as indirect evidence of myoglobulinuria.

There are many conditions that either cause or predispose to rhabdomyolysis including crush injury, direct compression, alcohol abuse, heat stroke, or infection such as influenza, leptospirosis but potentially fatal cases most commonly occur after exhaustive and strenuous exercise[10]. Exertional rhabdomyolysis occurs after acute overexertion. The reported cases of exertional rhabdomyolysis have been limited primarily to military and paramilitary personnel[1-7]. There are a few reports involving civilians who eloped exertional rhabdomyolysis from running or nce training[8]. However, there is no report of this condition with this kind of activity which takes place in every university in Thailand each year.

The clinical manifestations of exertional rhabdomyolysis range from mild myalgia to frank muscle pain, tenderness and weakness. Myoglobulinuria and elevation of muscle enzymes such as creatine kinase were evident[10]. In the reported cases, there was a very high level of creatine kinase in both cases reflecting a large amount of muscle damage. The differential diagnosis included pyomyositis, polymyositis and infection associated rhabdomyolysis, but were excluded because the patients had no fever and no clinical evidence of infection and connective tissue diseases. They also had complete recovery and no relapse during follow-up. Although the authors found only 2 cases during this cheer-training period it is believed there were many subclinical and mild cases that did not come to the hospital and had spontaneous improvement after rest and hydration. The groups of muscles that develop rhabdomyolysis are also related to the type of repetitive overexertion. In the presented cases, the clinical findings occurred in the calf muscles according to excessive and repetitive deep knee bends, which had been previously reported by Frucht[7]. Brown et al[1] reported upper extremity rhabdomyolysis following weight lifting.

There are many predisposing factors of exertional rhabdomyolysis including intense heat, high humidity, inadequate hydration, heavy eccentric work, renal insufficiency, recent viral illness, recent medication or drug use (aspirin, erythromycin, cocaine, alcohol and heroin)[8]. Risk factors in the presented cases were high temperature and humidity in June, and inadequate hydration.

Rhabdomyolysis may lead to many complications such as hyperkalemia, hyperuricemia, hypocalcemia or hyperphosphatemia, hypoalbulinemia, disseminated intravascular coagulation, lactic acidosis, compartmental syndrome, and renal failure[8]. But fortunately they did not occur in the presented cases according to early and aggressive hydration. The long-term prognosis of exertional rhabdomyolysis is good. The presented cases had normal physical activity after nearly a year of follow-up.

The risk of exertional rhabdomyolysis may be reduced significantly by gradually increasing exercise duration and intensity, avoiding exertion during time of intense heat and humidity, and taking adequate fluid. Prevention through education and monitoring of cheer-training activity is necessary. The appropriate duration and repetition of exertion should be discussed among the cheer staff leaders and the faculty. Dehydration and heat stress should be avoided. The physician should be aware of this condition and give prompt treatment to prevent serious complications.

(Received for publication on November 18, 2002)

REFERENCES

1. Brown JA, Elliott M, Sray WA. Exercise-induced upper extremity rhabdomyolysis and myoglobulinuria in shipboard military personnel. Mil Med 1994; 159: 473-5.
2. Watson DB, Gray GW, Doucet JJ. Exercise rhabdomyolysis in military aircrew: Two cases and a review of aeromedical disposition. Aviat Space Environ Med 2000; 71: 1137-41.
3. Walsworth M, Kessler T. Diagnosing exertional rhabdomyolysis: A brief review and report of two cases. Mil Med 2001; 166: 275-7.
4. Kuklo TR, Tis JE, Moores LK, Schaefer RA. Fatal rhabdomyolysis with bilateral gluteal, thigh, and leg compartment syndrome after the army physical fitness test. A case report. Am J Sports Med 2000; 28: 112-6.
5. Randall T, Butler T. Rehabilitation of ten soldiers with exertional rhabdomyolysis. Mil Med 1996; 161: 564-6.
6. Tietjien DP. Exertional rhabdomyolysis and acute renal failure following the army physical fitness test. Mil Med 1989; 154: 23-5.
7. Frucht M. Challenge, 110 deep knee bends: Rewards, rhabdomyolysis (letter). N Eng J Med 1994; 2: 1620-1.
8. Hurley JK. Severe rhabdomyolysis in well conditioned athletes. Mil Med 1989; 154: 244-5.
9. Knochel JP. Catastrophic medical events with exhaustive exercise: "White collar rhabdomyolysis". Kidney Int 1990; 38: 709-19.
10. Knochel JP. Machanism of rhabdomyolysis. Curr Opin Rheumatol 1993; 5: 725-31.

ภาวะกล้ามเนื้อสลายตัวตามหลังการออกกำลังกายเกินกำลังเนื่องจากการซ้อมเชียร์ของนักศึกษามหาวิทยาลัยปีที่ 1

อรรจนี มหรรฆานุเคราะห์, พบ,*
อภิชาต แสงจันทร์, พบ, ภิรุญ มุตสิกพันธุ์, พบ**

ภาวะกล้ามเนื้อสลายตัวจากการออกกำลังเป็นภาวะที่มีอันตรายต่อชีวิตเกิดจากการย่อยสลายของกล้ามเนื้อตามหลังการออกกำลังกายอย่างหนัก ภาวะนี้ทำให้เกิดภาวะแทรกซ้อนได้หลายอย่างเช่นไตวาย แม้ว่าภาวะนี้จะเกิดกับทหารมากที่สุด แต่ก็เกิดกับพลเรือนที่ออกกำลังกายมากเกินไปหลังเลิกงาน รายงานนี้เสนอผู้ป่วยเป็นนักศึกษามหาวิทยาลัยปีที่หนึ่ง 2 รายที่เกิดภาวะกล้ามเนื้อสลายตัวจากกิจกรรมซ้อมเชียร์ เพื่อให้ทราบถึงความเสี่ยงของกิจกรรมนี้ต่อภาวะกล้ามเนื้อสลายตัว เพื่อหาทางป้องกันไม่ให้เกิดขึ้นและเมื่อเกิดขึ้นแล้วสามารถให้การวินิจฉัยและรักษาได้ทันทีเพื่อป้องกันการเกิดภาวะแทรกซ้อนอันตราย

คำสำคัญ : ภาวะกล้ามเนื้อสลายตัวตามหลังการออกกำลังกายเกินกำลัง, ภาวะกล้ามเนื้อสลายตัว, ซ้อมเชียร์

อรรจนี มหรรฆานุเคราะห์, อภิชาต แสงจันทร์, ภิรุญ มุตสิกพันธุ์
จดหมายเหตุทางแพทย์ ฯ 2546; 86: 789–792

* ภาควิชาอายุรศาสตร์, คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น, ขอนแก่น 40002