

Acute Myositis of the Tibialis Anterior Muscle after Performance of 108 Prostrations

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Exercise-induced muscle damage (EIMD) can be caused by novel or unaccustomed exercise resulting in a temporary decrease in muscle function, increased muscle soreness and swelling, and an increase in muscle proteins in blood. A 38-year-old female presented with a 2-week history of bilateral lower leg pain and swelling that developed suddenly after performing 108 prostrations. Fat-suppressed contrast-enhanced T1-weighted magnetic resonance imaging showed bilateral symmetric high signal intensity of the tibialis anterior muscles. Our patient was diagnosed with acute myositis and treated with naproxen. History of physical exertion and acute onset of typical clinical findings of myositis were key elements in the diagnosis. Acute myositis related to exercise is a common and self-limiting condition which fully resolves after 2 to 3 weeks. However, other causes of myositis should be excluded in patients with atypical clinical features. (*J Rheum Dis* 2016;23:382-385)

Key Words. Myositis, Exercise, Inflammation, Magnetic resonance imaging

INTRODUCTION

Exercise-induced muscle damage (EIMD) is a multifactorial phenomenon characterized by skeletal muscle function loss due to exercise-related stress [1]. It is well established that eccentric exercise causes EIMD. The high stress and strain of eccentric contractions are associated with subsequent increases in markers of EIMD [2,3]. Muscle inflammation is a natural consequence of EIMD [4]. A current study indicates a similar response of both inflammatory and muscle damage markers, which peak at 1 day post-exercise [5]. We report a case of acute myositis of the bilateral tibialis anterior muscles, which occurred after the performance of 108 prostrations.

CASE REPORT

A 38-year-old female presented with a 2-week history of bilateral lower leg pain that developed suddenly after per-

forming 108 prostrations. Her pain was getting worse and she had marked difficulty walking and climbing stairs. Physical examination revealed tenderness and swelling over the anterolateral aspect of both lower legs, with no visible redness or evidence of weakness on manual muscle testing. Laboratory tests showed a white blood cell (WBC) count of 12,400/ μ L (normal, 4,000 to 10,000/ μ L), an erythrocyte sedimentation rate (ESR) of 52 mm/h (normal, 2 to 25 mm/h) and a C-reactive protein (CRP) level of 30.5 mg/dL (normal range, 0.1 to 5.0 mg/dL). Levels of aspartate transaminase, alanine transaminase, lactate dehydrogenase, creatine kinase (CK) and myoglobin were all within normal limits. Tests for antinuclear antibodies, rheumatoid factor and anti-Jo-1 antibody were all negative.

Fat-suppressed contrast-enhanced T1-weighted magnetic resonance (MR) imaging revealed diffuse enhancement with swelling of the tibialis anterior muscle and thickening of the anterior portion fascia, symmetrically in

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both lower legs (Figure 1). Biopsy of the left tibialis anterior muscle revealed endomysial inflammatory cell infiltration and endomysial fibrosis, with some evidence of necrosis and regeneration of myofibers (Figure 2). Results of the electromyography (EMG) study in bilateral tibialis anterior muscles showed increased insertional activities and polyphasic amplitude motor unit action potentials compatible with inflammatory myopathy. Based on these findings, the patient was diagnosed with acute myositis.

The patient was treated with naproxen 1 g per day. Her symptoms were not improved for a week. The level of WBC count was decreased to 8,900/ μ L but CRP was increased to 32.1 mg/dL at that time. After three weeks of treatment, her pain had subsided, and ESR and CRP levels had decreased to 39 mm/h and 1.04 mg/dL, respectively.

DISCUSSION

In Buddhist practice, 108 prostrations are performed to address 108 different types of human agonies. In this case, the patient developed myositis after performing 108 prostrations.

EIMD is characterized by the disorganization of skeletal muscle induced by unaccustomed exercise, leading to strength loss, soreness, swelling, and leakage of intracellular proteins (CK and myoglobin) into the blood

stream [1,6]. Muscle damage induces an inflammatory response that removes the damaged tissue and regenerates muscle tissue. The time course of this inflammatory response is variable and depends on several factors such as exercise mode, intensity, duration, and muscle groups utilized [7]. Many studies have reported a similar response of both inflammatory and muscle damage markers, which peak at 1 to 3 days and recover after 2 to 3 weeks post-exercise [5,8]. However, our patient had a high CRP level at 2 weeks post-exercise while CK and myoglobin levels remained normal throughout the course. The lack of muscle protein elevation may be due to the limited extent of muscles involved.

MR imaging has been a powerful tool to gain an understanding of what is occurring throughout the entire muscle [6]. Images obtained by short tau inversion recovery and fat-suppressed contrast-enhanced T1-weighting have a strong ability to illustrate edema in the muscles [9]. High signal intensity in these sequences indicates edema in the muscles, which suggests inflammation. Previous studies have shown that the changes in MR signal intensity after eccentric exercise persist after most other indicators of muscle damage and inflammation have been resolved. Nosaka and Clarkson [10] found increased MR signal up to 31 days post-exercise in some subjects.

Critical elements in the diagnosis of this patient were a history of uncommon physical exertion and acute onset of

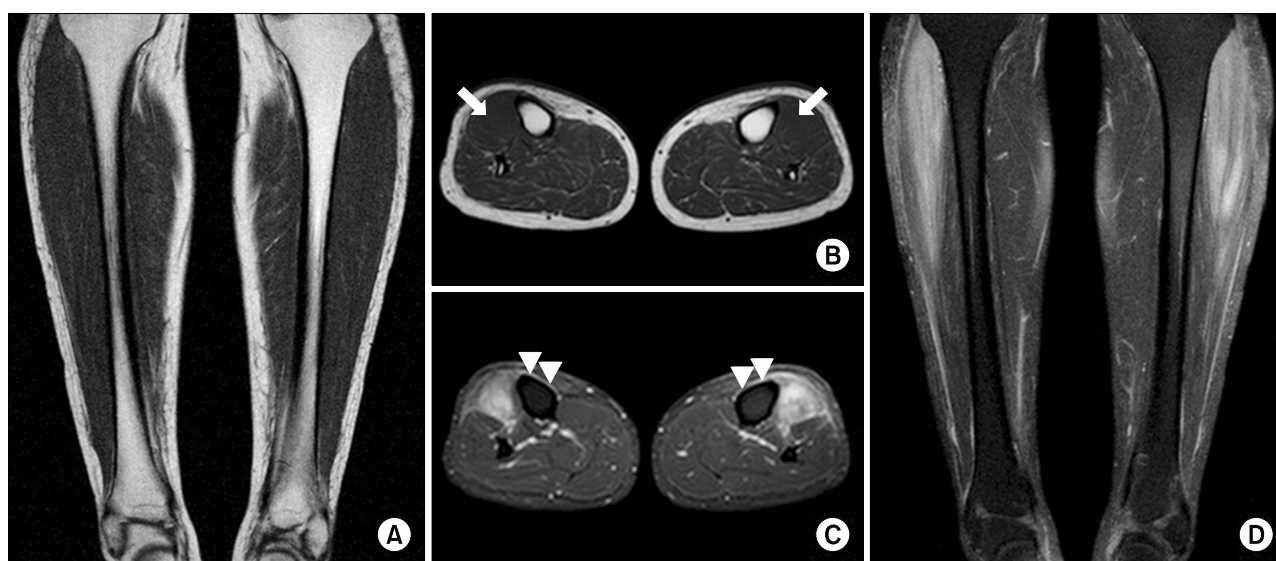


Figure 1. Magnetic resonance imaging of both lower legs. T1-weighted images (A, coronal and B, axial view) showing iso-signal intensity (arrows). Fat-suppressed contrast-enhanced T1-weighted images (C, D) showing bilateral symmetric high signal intensity of the tibialis anterior muscles and of the anterior portion fascia (arrowheads).

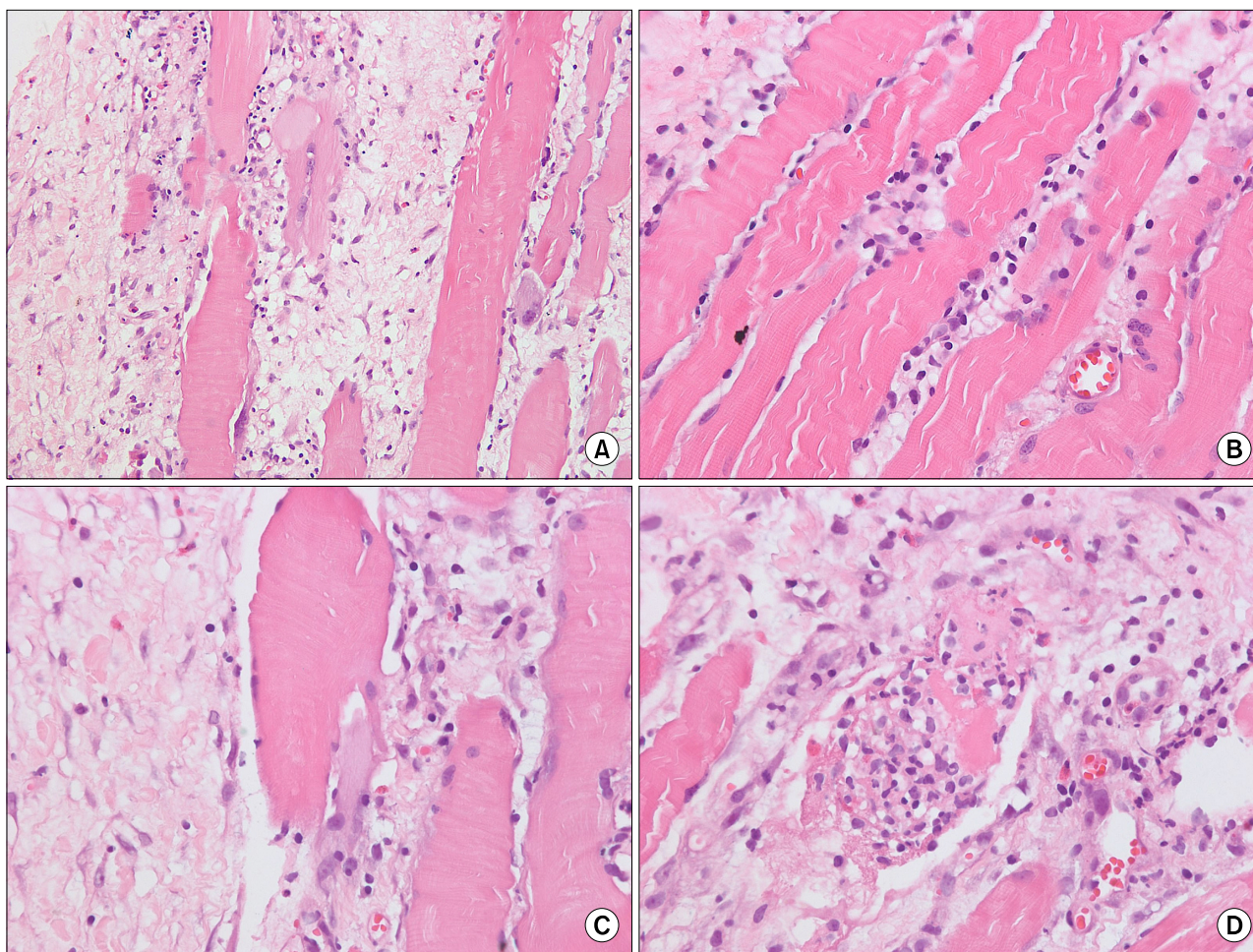


Figure 2. Biopsy of the left tibialis anterior muscle shows marked endomysial fibrosis (A) and lymphocytes infiltration (B). (C) Basophilic regenerating fibers are shown. (D) Necrotic myofiber are infiltrated by marked lymphocytes and histiocytes (H&E stain, A: $\times 200$; B ~ D: $\times 400$).

typical clinical findings of myositis involving the bilateral tibialis anterior muscles. Acute myositis related to exercise is a self-limiting condition that usually requires no treatment and fully resolves after 2 to 3 weeks. When atypical features are present, consideration and exclusion of alternative disorders, such as rhabdomyolysis, polymyositis, dermatomyositis, infections, muscular dystrophy, or use of drugs and toxins, is essential during the evaluation of the patient with lower extremity muscle pain and possible weakness [11].

Non-steroidal anti-inflammatory drugs (NSAIDs) are the most widely used type of drug for treating muscle damage and soreness. They inhibit the synthesis of prostaglandin, a potential mediator of edema and pain during acute inflammation, by inhibiting the metabolism of arachidonic acid [12]. Our patient was treated with NSAIDs, and symptomatic relief was achieved. However,

evidence is currently equivocal for the use of NSAIDs in the reduction of the signs and symptoms associated with EIMD. Furthermore, inflammation is the body's natural response to EIMD and the use of pharmacological agents may inhibit protein synthesis, thus inhibiting the recovery of muscle damage due to exercise. The long-term use of NSAIDs, thus, is not recommended as an effective strategy to treat symptoms of EIMD [12].

SUMMARY

Acute myositis related to exercise is a common and self-limiting condition. History of exercise, including mode, intensity or duration, and the muscle groups utilized, is the most helpful element in its diagnosis. Myositis has similar features on physical examination findings, EMG studies, elevated serum levels of muscle

enzymes, and muscle biopsy findings. Therefore, if patients have an atypical clinical course, clinicians should consider and exclude other causes of myositis.

CONFLICT OF INTEREST

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

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