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CASE REPORT

Bilateral Proximal Tibial Stress Fractures at the Epiphyseal Scar

Patrick N Siparsky MD, **Matthew G Kanaan** DO, **William E Garrett Jr** MD PhD

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INTRODUCTION

Tibial stress fractures are a common cause of pain in athletes including runners and are the most common stress fracture in athletes. The underlying pathoanatomy is microscopic cracks in the bone that never fully heal as a result of continued strain on the bone coupled with insufficient rest. The typical presentation is pain that initially begins with the onset of athletic activity, but eventually becomes persistent pain throughout the day with any loading of the bone. We present a case report of a 36-year-old male with bilateral proximal medial tibia stress fractures along the epiphyseal scar.

Despite the tibial diaphysis being the most common location for stress fracture, we found no report of stress fractures, much less bilateral injury, in this particular portion of the bone. Anterolateral cortex stress fractures are much less common, but are more problematic because they are on the tension side of the bone that heals less predictably when treated nonoperatively. Posteromedial stress fractures of the diaphysis tend to heal well nonoperatively. Some stress fractures may require intramedullary nailing or plating to produce sufficient stability for bony healing.

CASE REPORT

The patient is a 36-year-old, 5'9'' tall, 180-pound otherwise healthy male with the exception of hypercholesterolemia and a one pack per day smoking history for 10 years. He was training with his adolescent child who was running timed sprints followed by walking on asphalt for approximately 1 hour. He awoke the following day to significant pain in both of his lower extremities, localized specifically over the proximal-medial aspect of each tibia. This episode took place 3 months prior to his initial visit in our sports medicine clinic. He denies any history of pain or prior injury to this area. He denied any similar episodes to any of his immediate family members.

The patient was initially seen by an outside physician, who ordered physical therapy and a bone scan. The bone scan showed slightly increased uptake over the proximal medial tibia bilaterally. Despite a period of rest and no further running, the patient's symptoms persisted. Subjectively, his pain was consistently at least 6/10, and tended to be worse later in the day than in the morning. On physical exam, he had full painless knee range of motion and had no effusion. Both of his lower extremities were notably tender over the proximal medial flare of the tibia. This extended up to the medial joint line, but was not increased with provocative meniscal physical exam tests. He was stable to all ligamentous examinations and had no pain with varus or valgus stress.

At the patient's first visit to us, radiographs were significant for sclerosis and what appeared to be healing over the epiphyseal scar bilateral (Figs 1 and 2). The radiologist impressions were 'findings compatible with chronic stress fractures'. To further define this stress fracture and to rule out any other associated pathology, the patient was sent for magnetic resonance imaging (MRI) of the right proximal tibia and knee (as this was felt to be more symptomatic by the patient). Laboratory tests for serum vitamin D, calcium, phosphorus, and parathyroid hormone (PTH) were also ordered to verify that there was no nutritional or hormonal component to this bony problem.

Subsequently, all laboratory tests returned normal compared to reference ranges for our institution. The MRI images were consistent with a chronic stress fracture along the epiphyseal scar (Figs 3A to D). There was also callus noted at the edges of the stress fracture line, suggestive of healing. The musculoskeletal radiologist confirmed that the fracture was largely through the epiphyseal scar and concurred that this was very uncommon not only for its location, but also because of the bilateral occurrence. The patient was advised to cease any impact activities and any exercise should be confined to a stationary cycle. He began to experience a slight reduction in pain within the first month and it was felt appropriate to continue to follow him clinically.

DISCUSSION

Stress fractures are a common cause of pain in athletes, especially in runners,[5-8] and a common presentation in an orthopaedic practice. The underlying cause is a microscopic crack in the bone that never fully heals as a result of

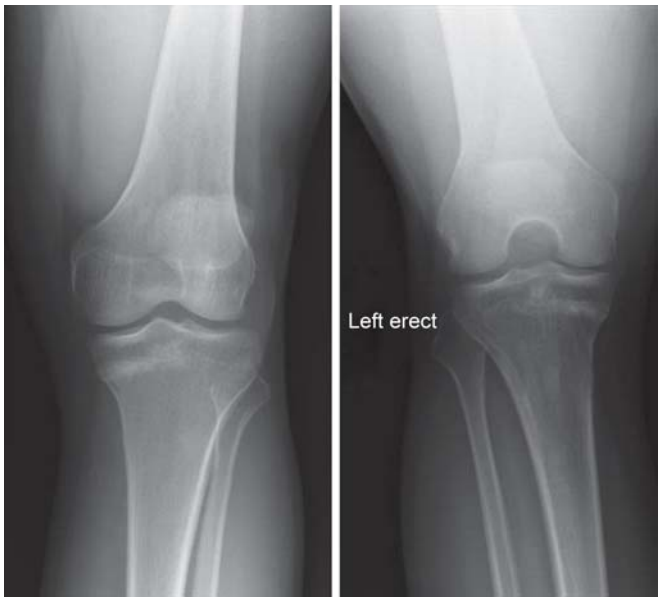


Fig. 1: Left knee anterior-posterior (AP) and posterior-anterior (PA) standing radiographs. Both images show sclerosis and periosteal new bone formation at the epiphyseal scar consistent with chronic stress fracture

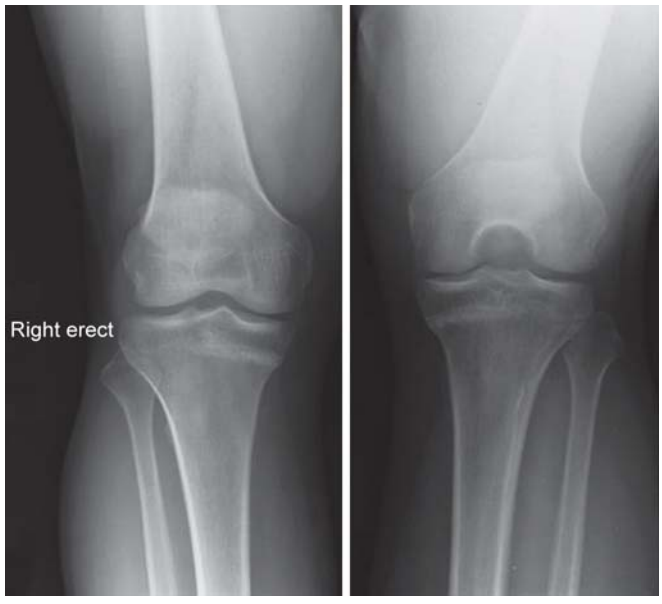
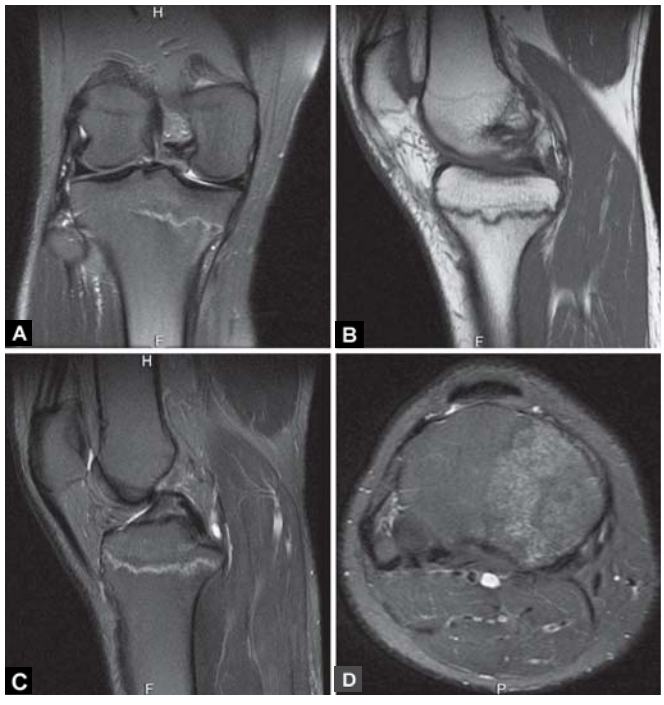


Fig. 2: Right knee anterior-posterior (AP) and posterior-anterior (PA) standing radiographs. Both images show sclerosis and periosteal new bone formation at the epiphyseal scar consistent with chronic stress fracture

continued strain on the bone. Anatomic variations, such as leg length discrepancies, and knee alignment have also been suggested to predispose some athletes to stress fractures.[2,3,8,10] There are often factors, such as nutritional deficiencies, poor footwear, or a rapid increase in physical activity that contribute to this pathology. The accumulation of these microscopic cracks can lead to an occult fracture that can be present in younger or older athletes. The typical presentation is pain that initially begins with the onset of athletic activity that over time becomes persistent pain throughout the day with any loading of the bone.

These fractures have been described in multiple locations, and as far back as the 1800's. Briethaupt first reported this injury in 1855 that, in 1897, was referred to as a 'march fracture' by Stechow[11] because of its appearance among those in the military. In athletes, the tibial shaft is one of the more common locations for stress fractures.[8,10] In fact, depending on the geographic location of a clinic, the incidence of tibial stress fractures may approach 75% of all stress fractures seen. Any part of the tibial diaphysis is susceptible, but the most common site is the posteromedial cortex.[1,9,10] Most patients will be diagnosed with unilateral stress fractures, but McCormick et al reported that roughly 16% of patients with a diagnosis of tibial stress fracture were found to have bilateral injury.[8] Not only are bilateral medial tibial stress fractures rare, we are unaware of any cases reported through the epiphyseal scar, such as we found in this patient. There are reports of distal femur epiphyseal stress fractures,[4] but these were unilateral and in younger patients.



Figs 3A to D: Right knee MRI: Coronal (A), sagittal (B, C), and axial (D) images of proximal medial tibial stress fracture. Note the fracture line and increased signal along the epiphyseal scar running from anteromedial cortex through to the posteromedial cortex

Treatment for stress fractures depends on the injury severity and on the relative activity of the patient. Stress fractures are sometimes classified as low-risk or high-risk injuries.[1] Low-risk stress fractures usually can be treated with relative rest for one to 6 weeks beginning with limited weight bearing and then a gradual return to activity, which is dependent on symptoms and radiographic evidence of

healing. Athletes can usually continue to perform low-impact activities, such as stationary or over the ground cycling, ellipticals, or swimming in order to maintain their conditioning. High-risk fractures have a high chance of progressing to complete fracture, delayed union, or nonunion. These often require a more aggressive plan of treatment including surgical options, such as intramedullary nailing to produce sufficient stability for healing.[1,5,7,10]

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ABOUT THE AUTHORS

Patrick N Siparsky (Corresponding Author)

Fellow, Sports Medicine Section, Department of Orthopaedic Surgery Duke University Medical Center, Durham, NC, USA
e-mail: psiparsky@gmail.com

Matthew G Kanaan

Fellow, Orthopaedic Primary Care, Sports Medicine Section Department of Orthopaedic Surgery, Duke University Medical Center Durham, NC, USA

William E Garrett Jr

Professor, Sports Medicine Section, Department of Orthopaedic Surgery, Duke University Medical Center, Durham, NC, USA