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Case Report

Segmental Stress Fracture of Tibia in Recreational Running: A Case Report☆,☆☆

Alexandre de Paiva Luciano[a,b,*], *Nelson Franco Filho*[c], *Fernando Adami*[d], *Luiz Carlos de Abreu*[d]

[a] *Department of Medicine, University of Taubaté, Taubaté, SP, Brazil*
[b] *Study Group on Sports Arthroscopy and Traumatology, University Hospital of Taubaté, Taubaté, SP, Brazil*
[c] *Orthopedics and Traumatology Service, University Hospital of Taubaté, Taubaté, SP, Brazil*
[d] *ABC School of Medicine, Santo André, SP, Brazil*

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ABSTRACT

One of the first steps to be taken in order to reduce lesions in sports, such as stress fractures, is to know the nature and extension of this pathology. What follows is a case report of segmental stress fracture of the tibia in recreational athletes, which is considered somewhat rare in the literature. Case report: a 40-year-old female patient who started to have follow-up medical checks due to unusual pain in her right leg, concentrated mainly on the proximal region of the knee and ankle, after a 10-km run for a period of one month. Segmental stress fracture of the tibia was diagnosed after clinical research and further examinations.

Fratura por estresse segmentária na tíbia em corredora recreacional

Palavras chave:
Fraturas de estresse
Tíbia
Corrida
Atletas

RESUMO

Os primeiros passos para se reduzirem lesões, como a fratura de estresse no esporte, é conhecer e aprofundar o estudo da natureza e a extensão dessa patologia. A seguir, apresentamos um relato de caso de fratura por estresse segmentar da tíbia, considerado raro na literatura consultada. Descrição do quadro clínico: trata-se de paciente de 40 anos, feminino, que iniciou seguimento médico por dores incaracterísticas na perna direita, concentradas principalmente em região proximal do joelho e do tornozelo direitos, durante a prática de corrida de rua de 10 km havia um mês. Após investigação clínica e por meio de exames complementares, diagnosticou-se fratura de estresse segmentar da tíbia.

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* Corresponding author.
E-mail: alexandrepaiva76@ig.com.br (A. de Paiva Luciano).

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Introduction

With the growing concern for health and quality of life that has been seen particularly over the last two decades, ever-greater numbers of people are seen to be doing exercise. This has led to a considerable increase in the frequency of diagnoses of stress fractures. These injuries have an undesirable effect, since they reduce the benefits relating to sports and act as a barrier against maintaining health and quality of life.

The first step towards diminishing sports injuries such as stress fractures is to have in-depth knowledge of the nature and extent of these pathological conditions.

In the following, we present a case report on segmental stress fracture of the tibia.

Description of the Clinical Condition

The patient was a 40-year-old woman born and living in Taubaté (SP). She said that she had been practicing running in the streets for six months and she was currently being accompanied by a sports adviser. Her training was divided into four sessions per week, namely: a "regenerative" run on Mondays; "sprint" training on an athletics running track on Wednesdays, "pace" training on Fridays; and long training or competitions at weekends. The patient was doing regular sports practice, but said that her volume was gradually increasing and that she had started high-intensity training on an athletics running track two months earlier.

She started to have medical follow-up due to unusual pain in her right leg, concentrated mainly in the region of the right knee and ankle during 10-km practice runs one month earlier. She said that she had not been making chronic use of any medications, had not had any previous surgery and had not had any previously diagnosed chronic diseases.

On physical examination at the time of admission, she weighed 65 kg, her height was 1.72 m and her BMI was 21.97. She did not have any pathological fascies.

Evaluation of the type of static and dynamic steps: pronated steps.

Physical examination of the knee:

- Inspection: knees with physiological valgus in front view, without recurvatum in lateral view; without any increase in volume.
- Bone palpation: medial tibial plateau painful on palpation, but without pain on palpation of the medial femoral condyle.
- Palpation of soft tissues: medial collateral ligament painful on palpation at its insertion in the tibia. Sartorius, gracilis and semitendinosus muscles painful at their insertion in the tibia.
- Joint stability tests: negative.
- Meniscal tests: negative.
- Patellofemoral tests: negative for patellofemoral syndrome.
- Degree of mobility: extension 0°, flexion 135°, internal and external rotation 10°.

Physical examination on the ankle:

- Inspection: pronated step on walking and running.
- Bone palpation: medial structures – pain on medial palpation of the distal tibia; lateral structures – no pain.
- Palpation of soft tissues: regions of interest – Zone III – medial malleolus: deltoid ligament, tendons: posterior tibial tendon, long flexor of the toes and long flexor of the hallux free from pain; Zone IV – dorsum of the foot between the malleoli: tendons: anterior tibial tendon, long extensor of the hallux and long extensor of the toes free from pain.
- Ankle stability tests: negative.
- Degree of joint mobility: dorsiflexion 20°, plantar flexion 50°, subtalar inversion 5° and subtalar eversion 5°.

Based on the physical examination described above, we continued the diagnostic investigation and the search for associated pathological conditions by means of the following examinations:

- Radiological examinations: radiographs and scanometry on the lower limbs – without significant alterations; right lower limb: 920.1 mm; left lower limb: 920.4 mm (Fig. 1).
- Bone densitometry on April 23, 2010 (Fig. 2): pattern within normality for the proximal region of the femur.

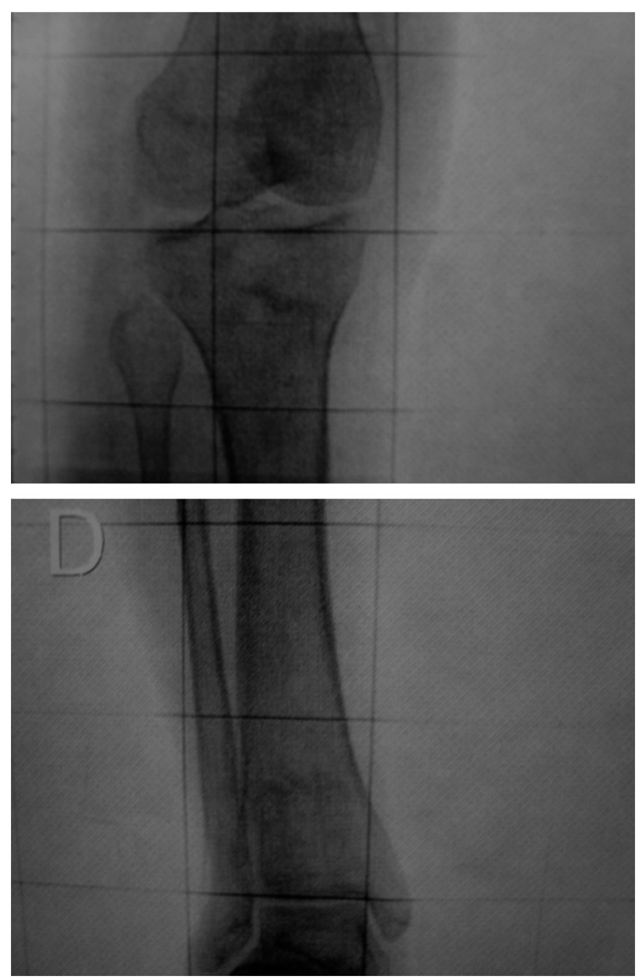

Figure 1 – Radiological examinations on the right knee and ankle, showing a tenuous line of bone continuity in the proximal and distal metaphysis of the right leg.

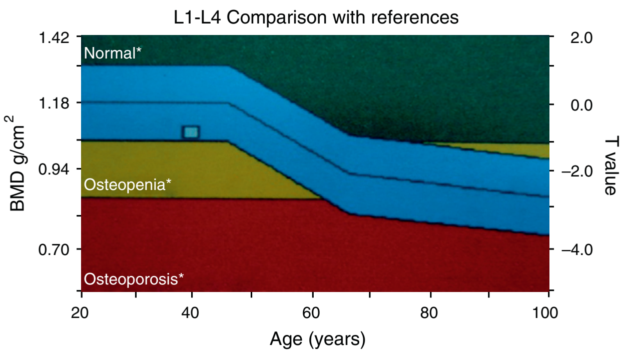

Figure 2 – Bone densitometry.

- Magnetic resonance imaging of the ankle on April 23, 2010 (Fig. 3).
- Magnetic resonance imaging of the knee on April 23, 2010 (Fig. 4).

Discussion

In sports practice, stress fractures are clinical entities that also fit into the well-known overuse syndrome.[1,2]

The etiology of stress fractures can be best described as accelerated bone remodeling in response to submaximal repetitive stress. The bone responds and forms new periosteal bone as an extra reinforcement. However, if the osteoclastic activity continues to exceed the mean number of osteoblasts for new bone formation, a fracture in the cortical bone may eventually occur.[3]

The risks of fracture due to stress are influenced by various factors and are divided into intrinsic factors (sex, age, ethnicity and muscle strength), extrinsic factors (training regimen, type of footwear used, training surface and type of sport), biomechanical factors (bone mineral density and bone geometry), anatomical factors (foot morphology, leg length discrepancy and knee alignment), hormonal factors (delayed menarche, menstrual disorders and contraceptives) and nutritional factors (calcium and vitamin D deficiencies, food disorders and the female athlete triad).[2,3]

Studies have shown that female athletes present greater numbers of stress fractures than shown by men.[3,4]

Stress fractures generally occur in groups of young individuals who are subjected to intense physical activities, such as military recruits, dancers, runners and athletes in general. This type of fracture occurs mainly in bones of the lower extremities, such as the metatarsus, fibula, calcaneus and, most frequently, the tibia.[5]

The tibia is the commonest site for stress fractures to occur in athletes. The location of the fractures varies according to the type of sport practiced. In runners, fractures are found at the transition from the middle to distal third.[5]

The differential diagnosis should include both middle tibial stress syndrome (MTSS) and chronic compartmental syndrome (CCS).[6]

Magnetic resonance imaging may also diagnose stress fractures at an early stage. The signs are bone edema, which may be found in the region anterior to the tibial cortical bone, in the bone marrow, or even a fracture line, as in the case described.[7]

Figure 3 – Radiological examinations showing an area of hypersignal on T2 weighted image, in the distal region of the right tibia, with solution of continuity in the posterior cortical bone, which may correspond to a stress fracture.

In the initial phase of the treatment, it is recommended that specific physiotherapeutic measures should be used to reduce the painful condition, such as cryotherapy, TENS, ultrasound to accelerate bone tissue production and laser as a healing method. In addition, anti-inflammatory drugs are used to reduce prostaglandin synthesis, which is responsible for activating the free nerve ends that take sensory information to the brain and increase the perception of pain.[8] Functional stretching and strengthening exercises should be

Figure 4 – Area of hypersignal on T2 weighted image, in the proximal region of the right tibia, with solution of continuity in the posterior cortical bone, which may correspond to a stress fracture.

included as soon as the painful condition has been reduced. Thus, lower-limb exercises are initially done in a closed kinetic chain and then in an open kinetic chain.[9]

Stress fractures that are considered to present high risk should be treated surgically, given that the chances of success with conservative treatment are low.[10]

In the literature investigated, we found cases of bilateral stress fractures in the lower limbs.[11] However, we did not find cases of segmental fractures of the tibia, which proves the rarity of the case reported here. Like the majority of stress fractures, the fractures diagnosed in this case were considered to be low-risk cases and were treated as such. This case was conducted in accordance with a protocol described in the literature, with two phases of treatment.[10] Phase 1 is characterized by pain control through medical prescription of analgesics; reduction or cessation of sports movements that cause symptoms; and introduction of physiotherapeutic methods. Phase 2 is characterized by the measures of Phase 1 plus a gradual return to sport; in this phase, correction of predisposing factors is important (type of floor, type of steps, biomechanics of running and regular renewal of footwear). Phase 2 begins when the athlete is free from pain and presents normal nobility, around 10–14 days after the start of symptoms. The time taken to return to sports movements depends on many factors, including the severity and chronicity of the injury and the athlete's functional morbidity level.[10]

Conflicts of Interest

The authors declare no conflicts of interest.

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