

Mid-Anterior Tibial Stress Fracture in a Female Elite Athlete

A Case Report

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Abstract

We report the case of an unusual tibial stress fracture and its successful surgical treatment in a female elite sprinter 2 years after complete consolidation of the same tibia following resection of an osteoid osteoma.

Key Words

Osteoid osteoma · Lower leg pain · Overuse · Intramedullary nailing · Sports

Eur J Trauma Emerg Surg 2007;33:96–98

DOI 10.1007/s00068-007-6068-y

Introduction

Lower extremity pain is a very frequent complaint in the athletic population [1]. The differential diagnosis is broad and includes stress fractures [2, 3], periostitis, myositis, tendinitis, osteitis, and in rare situations bone tumors [4]. Precise and early detection of the underlying cause with correct treatment are indispensable for the athlete's career [4–7].

Tibial stress fractures occur most frequently in the postero-medial part of the tibia. Conservative treatment (rest, non-steroidal anti-inflammatories, ultrasound, laser, magnetic field, and electrotherapy) may lead to early return to sports. If the stress fracture lies in the mid-anterior part of the tibia, conservative treatment often fails and surgical intervention is necessary [8, 9]. Mid-anterior tibial stress fracture was first described by Burrows [8] and represents about 5% of all tibial stress fractures and only 2% of all stress fractures.

Osteoid osteoma is a benign bone tumor. Symptomatic patients typically complain about pain during the night that increases over time. Pain responds

positively to medical treatment with salicylates. Open resection is indicated when chronic pain is persisting despite conservative treatment.

Case Report

A 22-year-old elite sprinting female athlete presented with swelling and chronic pain in the right tibia (Figure 1). Two years ago, an osteoid osteoma in the mid-anterior tibia was resected elsewhere (Figure 2). After rehabilitation and progressive return to sprinting performance, the patient suffered without any injury again from mid-anterior pain due to exertion. No improvement was seen under conservative treatment (rest, non-steroidal anti-inflammatories, ultrasound, laser, magnetic field, and electrotherapy). She was forced to interrupt her athletic career.



Figure 1. Endurated swelling of the anterior lower extremity (right side).

The physical examination 18 months after resection revealed an indurated swelling with pain on palpation at the mid-anterior right tibia. Pain was

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Received: March 22, 2006; revision accepted: August 17, 2006;
Published Online: March 1, 2007



Figure 2. Radiograph after resection and curettage of the osteoid osteoma (lateral view).



Figure 3. Radiographs 18 months after resection showing the anterior tibial stress fracture (oblique view).

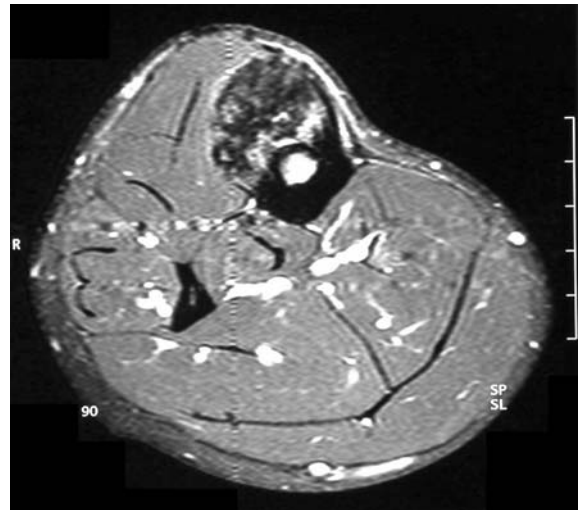


Figure 4. MRI of the mid-anterior tibial stress fracture with irregular bony formations (axial view).

aggravated with dorsiflexion of the foot. Dorsi- and plantarflexors were tightened. The peripheral neurosensitivity was normal. Radiographs showed an unusually narrow medullary canal, a thickened anterior cortex, and a linear unicortical fracture line in the mid-anterior tibia (Figure 3). Magnetic resonance imaging (MRI) confirmed a secondary stage IV mid-anterior tibial stress fracture [10] (Figure 4).

Our therapy consisted of reamed intramedullary nailing with open autologous bone grafting and decortication (Figures 5 and 6). The fracture was consolidated 6 weeks postoperatively and the patient stayed free of pain under progressive loading. Three months after surgery our patient could return on the track and continue her athletic career.

Discussion

Mid-anterior tibial stress fracture is a rare but serious sports injury, which can be career-ending for athletic professionals [8, 9, 11, 12]. Symptoms include local pain on exertion, inflammation, and swelling. The patient may also experience symptoms that overlap with other causes such as periostitis, tibial stress reaction, anterior tibial compartment syndrome, myositis, tendinitis, fascial hernia, osteomyelitis, or bone tumors [4]. A change in training behavior activities is frequently found in the patient's history. The professional athlete often continues sports exercises until the patient is unable to cope with discomfort.

The diagnosis of mid-anterior tibial stress fracture is based on patient's history, physical examination, radiographs, and MRI findings [13]. Radionuclide scanning is unspecific and therefore of little value [13].

The treatment of stage I and II mid-anterior tibial stress fractures according to the MRI classification described by Fredericson et al. [10] consists of rest, reduced activity in sports, and occasionally analgesic medication [9]. Batt et al. [11] described a conservative management with the use of a pneumatic leg brace in conjunction with activity modification. Most cases will resolve within 6 weeks. Treatment of stage III or IV requires operative treatment [14–16]. Also, stress fracture non-unions or chronic stress fractures of the mid-anterior tibia are recalcitrant to non-operative therapy [8, 9, 12]. Therefore, secondary non-union mid-anterior tibial stress fracture as described in our case is an unequivocal indication for operative treatment. Reamed intramedullary nailing without proximal screw fixation, which may lead to residual discomfort, was performed. This intervention allows immediate post-operative partial weight-bearing (maximum of 20 kg for 6 weeks) and minimizes soft tissue morbidity. Therefore, intramedullary nailing was preferable to plate fixation. Reamed intramedullary nailing led to complete bone healing and early return to competitive sports without any complications (Figure 6). To avoid any risk of persistent non-union and to optimize the biological process, decortication and cancellous



Figure 5. Intraoperative view after decortication and bone grafting.

bone grafting was performed at the same time, although unlocked tibial nailing alone would probably be able to heal this stress fracture. Proximal and/or distal interlocking was not necessary, as there was no rotational instability.

Conclusions

The presented case describes rare mid-anterior tibial stress fracture and its successful surgical treatment by reamed intramedullary nailing in a female elite athlete 2 years after complete consolidation of the same tibia following resection of an osteoid osteoma.

Mid-anterior tibial stress fracture is a rare but serious finding that has to be thoroughly considered in the differential diagnosis of lower leg pain. Equally important is the choice of the optimal treatment strategy for each stage of such fractures.

Reamed intramedullary nailing without proximal or distal interlocking can be considered as promising intervention for stage III and IV mid-tibial stress fractures.

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Figure 6. Radiographs 6 months after reamed intramedullary nailing without interlocking (ap and oblique view).

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