

## Insufficiency fractures in patients with chronic inflammatory joint diseases

H.M. Mäenpää<sup>1</sup>, I. Soini<sup>1</sup>,  
M.U.K. Lehto<sup>2</sup>, E.A. Belt<sup>1</sup>

<sup>1</sup>Rheumatism Foundation Hospital, Heinola; <sup>2</sup>Tampere University Hospital, Tampere, Finland.

Heikki M. Mäenpää, MD, PhD; Irma Soini, MD, PhD; Matti U.K. Lehto, MD, PhD; Eero A. Belt, MD, PhD.

Please address correspondence to: Dr. Heikki Mäenpää, Rheumatism Foundation Hospital, Department of Orthopaedics, FIN-18120 Heinola, Finland.

E-mail: heikki.maenpaa@scanpoint.fi

Received on January 31, 2001; accepted in revised form on September 5, 2001.

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**Key words:** Rheumatoid arthritis, stress fracture, insufficiency fracture, osteoporosis.

### ABSTRACT

**Objective:** To describe the typical sites of stress fractures in the lower extremities and pelvis in rheumatoid patients (rheumatoid arthritis, juvenile chronic arthritis, psoriatic arthritis, ankylosing spondylitis).

**Methods:** Thirty-three patients with 52 stress fractures [mean age 44 years (range 11-73)] were studied at the authors' institution when they were being treated for their rheumatic diseases. Fourteen patients had RA, 9 JCA, 5 PsoA, and 5 SPA. Stress fractures were detected from patient documents and from series radiographs in suspected cases. In some cases magnetic resonance imaging was also performed.

**Results:** One patient presented with 5 fractures, 2 patients with 4 and 3 fractures each. Other patients (n = 19) had only one fracture each. The metatarsal (MT) bones were the most common site of involvement. Twenty-five of the 52 fractures were located on MT I-V. The second and third most common sites were the fibula (n = 13) and tibia (n = 6). All fractures of the lower tibia or fibula were associated with valgus malalignment of the ankle.

**Conclusion:** If a patient with rheumatic disease experiences sudden and unexplained pain localised in the forefoot, above the ankle, below the knee, or in the pelvis, a stress fracture should be suspected. Patients with severe osteoporosis, high-load corticosteroid or methotrexate therapy, or marked joint deformity are at high risk of developing stress fracture.

### Introduction

Stress fractures occur rather frequently among rheumatoid patients. The causes include osteoporosis, corticosteroid and methotrexate therapy, joint stiffness, or deformity, but also unaccustomed exercise after reconstructive joint surgery (1). Pain, swelling, and disability arising from the fracture site are sometimes initially misdiagnosed. Diagnosis may be delayed by the late appearance of callus (2), and radiographs are often normal until the development of a periosteal reaction or cortical thickening 2-4 weeks after the ap-

**Table I.** Demographic data of the 33 patients with chronic inflammatory joint disease and insufficiency fractures. (mean, range, proportion).

Parameter	Value
Male/female (n)	3/30
Age (year)	44 (11-73)
CRP (mg/ml)	25 (0-99)
ESR (mm/h)	35 (3-141)
Corticosteroid dosage (mg/d)	7 (1-20)
Cytotoxic medication (n)	17/33
Duration of the disease (year)	21 (1-60)

CRP: C-reactive protein; ESR: erythrocyte sedimentation rate; Corticosteroid dosage: prednisolone equivalent dosage/day.

pearance of symptoms. Little information is available in the literature concerning the sites of stress fractures in these patients. The aim of the present study was to describe the typical sites of stress fractures in patients with rheumatoid arthritis.

### Materials and methods

We studied 33 rheumatoid patients who had a total of 52 stress fractures of the lower extremities or pelvis. Patients were treated at the authors' institution, Rheumatism Foundation Hospital (RFH), Heinola, Finland, between 1995-1999 for their chronic inflammatory joint diseases, which included rheumatoid arthritis (RA), juvenile chronic arthritis (JCA), psoriatic arthritis (PsoA), and ankylosing spondylitis (SPA). The diagnoses of stress frac-

**Table II.** Distribution of the anatomical sites of insufficiency fractures (n = 54) in patients (n = 33) with chronic inflammatory joint diseases.

Anatomical site	N
Metatarsal bones (I-V)	25 (1-10-7-4-3)
Fibula	13
Tibia	6
Calcaneus	3
Proximal shin	2
Distal shin	2
Femoral neck	1
Distal femur	1
Sacrum	1

Proximal and distal shin; simultaneous tibial and fibular fractures.



**Fig. 1.** Stress fracture of the MT III in a patient with JCA.

tures were based on series of plain radiographs in every patient, but in some cases magnetic resonance imaging (MRI) was also performed. The mean age of the patients (30 women, 3 men) was 44 (range 11-73) years at the time of diagnosis. Patients with traumatic and periprosthetic fractures were excluded. All patients experienced sudden pain and swelling without obvious injuries localised over the site of invol-



**Fig. 2.** Simultaneous proximal tibial and fibular stress fracture with severe valgus deformity of the knee in a patient with RA. Note the severe osteoporosis. This patient underwent total knee replacement.

vement, fulfilling the criteria for stress (insufficiency) fracture.

### Results

There were 14 patients with RA (mean disease duration 22 years), 9 patients with JCA (24 years), 5 patients with PsoA (17 years), and 5 patients with SPA (18 years). Ten patients were treat-

ed with oral corticosteroids (prednisolone) and 3 patients received cytotoxic agents (methotrexate). Combination medication was given to 14 patients.

One patient had 5 fractures, 2 patients had 4 fractures, 2 patients had 3 fractures, and 7 patients had 2 fractures. Other patients ( $n = 19$ ) had only 1 fracture. The metatarsal (MT) bones (25/52 fractures) were the most common sites of involvement (Fig. 1), and of these MT II ( $n = 10$ ) was involved most frequently. Thirteen fractures were located on the fibula and 6 on the tibia. Four patients had both tibial and fibular fractures presenting simultaneously; 2 of these were on the distal and 2 on the proximal shin (Fig. 2). One distal femoral fracture and 1 femoral neck fracture were detected. Moreover, 3 calcaneal fractures (Fig. 3) and 1 sacral fracture were found. Most patients experienced sudden pain and swelling, especially after femoral and shin fractures. A female patient with a dislocated femoral neck fracture underwent emergency surgery for severe pain and disability. On the other hand, in some cases of MT fractures patients had only mild pain and swelling, and the positive diagnosis was made by pure coincidence. All the stress fractures were primarily suspected and verified within 4 weeks after the complaint.

Calcaneal fractures presented diagnostic problems and were confirmed by MRI during the first 4 weeks. Later they could also be detected in plain radiographs. Two patients with sacral fracture experienced low back pain with sciatica, and the diagnosis was confirmed by MRI. All fractures of the distal tibia and fibula were associated with valgus malalignment of the ankle. One patient with distal shin fracture had previously undergone ankle arthrodesis. All 3 patients with distal fibular fracture showed valgus deformity of the hindfoot with subtalar destruction. All but 2 patients (1 combined proximal shin and 1 subcapital femoral fracture) were treated non-surgically. Rest and non-weight-bearing with crutches were the therapeutic approaches used most frequently. Some patients required bracing to reduce the level of activity.



**Fig. 3.** Stress fracture of the calcaneus in a patient with RA. Plain radiographs taken repeatedly within the 1st month were negative.

## Discussion

Tenderness or swelling arising from the joints, tendons, or bursae is not usually a diagnostic problem in patients with RA. If these complaints are located in the bone, stress fractures should be suspected. Our patients typically experienced sudden and severe pain localised over the foot, above the ankle, or below the knee. Diagnosis is frequently confirmed radiographically within 4 weeks. In the present series, only calcaneal fractures presented diagnostic problems and were confirmed by MRI. MRI investigation offers excellent sensitivity (3), but unfortunately it is often contraindicated in patients with RA due to metal fixators and implants. Computerised tomography (CT) and bone scintigraphy (4) are also beneficial in the early diagnosis.

Deformities of the lower limb were often present, valgus angulation of the knee or subtalar joint occurring most

frequently (2). Factors related to ankle or subtalar arthrodesis contribute to stress fractures by increasing the bending forces transmitted to the distal aspect of the tibia by the longer lever arm of a more rigid foot associated with a concomitant decrease in the mechanical strength of the bone (5). Osteoporosis occurred frequently in these patients. One patient with combined proximal shin fracture showed severe osteoporosis and underwent total knee replacement. In the present series only one subcapital femur fracture was encountered (6).

If a rheumatoid patient experiences sudden, unexplained pain localized in the forefoot, above the ankle, below the knee, or in the pelvis, stress fracture should be suspected. Patients with severe osteoporosis, high-load corticosteroid or methotrexate therapy, or marked joint deformity are at high risk of developing stress fractures (1, 7).

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