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Stress fracture of the second proximal phalanx of the foot in teenage athletes: Unrecognized location of stress fracture

Satoshi Yamaguchi [a, b, f, *], Shuji Taketomi [c, f], Yusei Funakoshi [d, f], Kan Tsuchiya [e, f], Ryuichiro Akagi [b, f], Seiji Kimura [b], Aya Sadamasu [b, f], Seiji Ohtori [b]

[a] Collage of Liberal Arts and Sciences, Chiba University, Japan
[b] Department of Orthopaedic Surgery, Graduate School of Medicine, Chiba University, Japan
[c] Department of Orthopaedic Surgery, Faculty of Medicine, The University of Tokyo, Japan
[d] Department of Orthopaedic Surgery, Seirei Hamamatsu General Hospital, Japan
[e] Kitachiba Spine & Sports Clinic, Japan
[f] "Socrates" Football Medicine Study Group in Kanto Region, Japan

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ABSTRACT

Background: Adolescent athletes are a high-risk population for stress fractures. We report four cases of stress fractures of the second proximal phalanx, which had not been previously diagnosed as the location of the stress fracture of the foot, in teenage athletes.
Case report: All fractures were on the plantar side of the proximal phalangeal base, and the oblique images of the plain radiograph clearly depicted the fractures. Notably, three out of the four patients had histories of stress fracture of other locations. While three athletes with acute cases were able to make an early return to play with simple conservative management, the chronic case required surgical treatment for this rare injury.
Conclusion: Although a rare injury, it is important that clinicians be aware of this type of stress fracture, as a timely diagnosis can avoid the need for surgical treatment and allow an early return to play.

Introduction

Stress fractures commonly occur in the foot and ankle, due to the high stress associated with weightbearing on relatively small bones.[1,2] Adolescent athletes are a high-risk population for stress fractures, due to the rapid increase in the amount and/or intensity of their involvement in sports.[3,4] Early diagnosis and timely management are important for a successful clinical outcome and an early return to play.[5] Late identification may predispose the injury to non-union of the bone fragments and necessitate surgical intervention rather than conservative management.[6] However, the diagnosis of fracture is frequently missed, particularly in cases of uncommon locations.[6] While common locations of stress fracture in the foot include the metatarsal, navicular, and calcaneus, they can also occur in almost all tarsal bones, such as the cuneiform, cuboid, and first proximal phalanx. Therefore, a high index of suspicion and early investigation are necessary. We report four cases of stress fractures of the second proximal phalanx, which had not been previously diagnosed as the location of the stress fracture, in teenage athletes. While athletes with acute cases were able to make an early return to play with conservative management, the chronic case required surgical treatment for this rare injury.

Case reports

Case 1

A 15-year-old male soccer player presented with a one-week history of pain and swelling in the right second metatarsophalangeal joint. He had a history of lumbar spondylolysis two years before the onset of his foot pain. He had no relevant history of trauma or systemic musculoskeletal disease. Foot malalignment, such as cavus foot or flatfoot, was not observed on physical examination. No specific finding was noted on the radiographs of the foot at the first visit (Fig. 1A and B). However, the axial fat-

* Corresponding author. Collage of Liberal Arts and Sciences, Chiba University, 1-8-1 Inohana, Chuo-ku, Chiba 260-8670, Japan.
E-mail address: y-satoshi@mvb.biglobe.ne.jp (S. Yamaguchi).

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Fig. 1. Case 1. A 15-year-old male soccer player. (A) Dorsoplantar and (B) oblique radiographs of the second metatarsophalangeal joint at the first visit are unremarkable. (C) Axial fat-suppressed T2-weighted magnetic resonance image shows high signal areas in the proximal phalanx and surrounding soft tissue (arrow).

suppressed T2-weighted magnetic resonance images exhibited high signal areas in the base of the second proximal phalanx, as well as in the surrounding soft tissue (Fig. 1C). Based on the clinical and radiographic findings, the lesion was diagnosed as a stress fracture of the second proximal phalanx.

The patient was instructed to stop sports participation, although weightbearing and daily activities were not restricted. The pain and swelling were relieved by the follow-up visit after four weeks, and the patient gradually returned to play. The radiographs taken eight weeks after the first visit showed a clear fracture line and callus formation on the plantar side of the proximal phalangeal base (Fig. 2A and B). Three years later, the patient visited our clinic again for treatment of a stress fracture of the fifth metatarsal on the same foot. The radiographs showed complete healing of the second proximal phalangeal stress fracture (Fig. 2C).

Case 2

A 15-year-old male soccer player was referred to our clinic with pain and swelling in the right second metatarsophalangeal joint. He was initially diagnosed as having inflammation of the joint, and received physical therapy. The patient continued to play soccer and the pain persisted for 12 months. He had a history of spondylolysis six months before his first visit, and also had stress fractures in the bilateral tarsal navicular that were already under treatment. On physical examination, a flexible claw toe deformity of the second toe was noted. The radiographs of the second metatarsophalangeal joint revealed a fracture on the plantar aspect of the second proximal phalangeal base (Fig. 3A and B). Similar to Case 1, the fracture line was clearly depicted on the oblique image (Fig. 3B). On the sagittal images of computed tomography, the fracture fragment on

Fig. 2. Case 1. (A) Dorsoplantar and (B) oblique radiographs of the second metatarsophalangeal joint after eight weeks clearly depict the fracture line on the plantar side of the proximal phalangeal base and the callus formation (arrow). (C) Oblique radiograph three years after injury. The fracture is completely healed (arrowhead).