Sprain Injury in a Child: Where is the Fracture Line?

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A 10-year-old male patient presented to the emergency department complaining of foot pain after sustaining a sprain injury. He could not bear weight on his right foot and there was swelling along the lateral aspect of his foot. On physical examination, there was tenderness to palpation on the proximal segment of the 5th metatarsal bone. A foot X-ray is shown in Figure 1. What is your diagnosis?

[see page 33 for diagnosis]

Figure 1.

Submitted: 26.03.2013 **Accepted:** 02.04.2013 **Published online:** 18.07.2013

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DIAGNOSIS: Fracture of the Proximal Part of 5th Metatarsal with a Normal Apophysis

Of all metatarsal fractures, 45% are 5th metatarsal bone fractures. Fifth metatarsal bone fractures are observed most often in the proximal portion of the bone.[1] Foot Fractures are usually caused by extreme inversion or direct trauma. Physicians must be aware of the structure of 5th metatarsal bone in adolescents. On foot X-rays, the apophysial plate is observed on the tuberosity of 5th metatarsal bone during the ages of 9-14 years. The apophysis is parallel to the metatarsal bone shaft and is physically separate from the metatarsal bone. The apophysis of the metatarsal bone may be mistaken for a fracture in adolescents that are being evaluated for foot pain (Figure 2). It may take up to 19 years of age for the apophysis to become firmly attached to the 5th metatarsal bone.[2]

The tendon of the peroneus brevis attaches to the apophysis, making this structure especially important. This tendon contains vessels and nerves that supply the 5th metatarsal bone. A fracture of the proximal part of the 5th metatarsal bone may compromise the localized blood supply and may result in fracture malunion. A splint may be used for 4-6 weeks to allow the fracture to heal.[3] However, if a collapse of more than two millimeters is observed, then surgery is necessary to correct the defect. Missing a diagnosis of a 5th metatarsal bone fracture may cause permanent impairments in ambulation. Thus, the 5th metatarsal bone must be carefully examined on foot X-rays so to avoid overlooking a fracture in this location.

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Figure 1. Foot X-ray of a 10 year-old male patient (white arrow indicates fracture).

Figure 2. (a) Lateral X-ray of the patient. **(b)** Red line (*) denotes a fracture in the proximal part of the 5th metatarsal bone. Blue line (#) indicates a normal apophysis. **(c)** Normal 5th metatarsal bone in an adolescent. (Note that there are no fractures in the proximal portion of the bone and the apophysis line is normal).