

Cuboid Fracture in a Toddler Discovered on the Whole Body Bone Scan: A Case Report

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ABSTRACT

This report presents a 3.5-year-old boy who was hospitalized for limping. Medical history and physical exams were not suggestive for any definitive diagnosis. Laboratory and radiographic exams did not support any specific diagnosis either. Subsequently bone scan was performed and increased activity in the ankle due to cuboid fracture was incidentally observed.

Keywords: Cuboid fracture, Bone scintigraphy, Limping, Toddler fracture

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CASE REPORT

A 3.5-year-old boy was referred to our department due to right lower extremity pain and limping for 3 weeks with no history of significant trauma. Overall he was a healthy child with good general condition. He had been evaluated previously for right hip septic arthritis. Laboratory exams included complete blood count, blood chemistry and erythrocyte sedimentation rate were all within the normal range. X-rays of the hip joints, femora, knee joints, tibiae, and fibulae didn't show any abnormality.

The patient underwent 3-phase bone scintigraphy which showed increased uptake in the mid-foot region on the dynamic phase being localized in the cuboid bone on the static images (Figure 1).

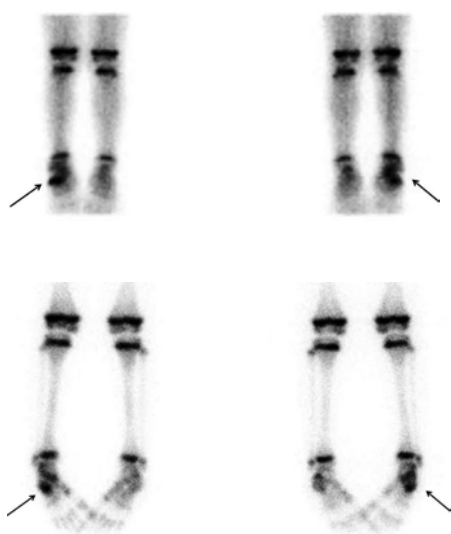


Figure 1. Blood pool (top) and delayed (bottom) images of the patient's feet. Abnormal activity is noted in the mid foot region (arrows).

Physical examination showed minimal swelling of the dorsal aspect of the right foot. The patient didn't have fever. Subsequently X-ray of the right foot was obtained which showed sclerosis at the base of the right cuboid bone (Figure 2), and fracture of the cuboid was confirmed.

DISCUSSION

Limping is defined as any asymmetric deviation from normal gait pattern. The differential diagnoses of limping are trauma, infection, neoplasia, inflammatory, congenital, neuromuscular or developmental disorders (1).

Toddler's fractures are occult injuries which occur when children begin walking. Several traumatic mechanisms can result in various fractures in these regions including repetitive stress on normal bone causing fracture of the tibia, jumping from a height for first metatarsal base fracture, impaction injuries for calcaneal fracture, forced dorsiflexion for talar fracture and forced plantar flexion for cuboid fracture also called nutcracker fracture (due to compression between the calcaneus and the metatarsal bones) (2).

Cuboid fracture is uncommon and is clinically significant because of the role of the cuboid in mechanical alignment of the foot. The functional architecture of the foot is formed by medial and lateral columns. The medial column is made of tarsal navicular, cuneiforms, and the first and second metatarsals and toes. The cuboid in addition to the fourth and fifth metatarsals and toes make the lateral column (3). Fracture of the cuboid results in loss of the lateral column support and this in turn would result in excessive valgus displacement of the medial column and forefoot and may cause medial soft-tissue distraction-type injuries such as the commonly associated posterior tibial tears (3). In toddler's fractures the diagnosis is usually made by plain radiographs. However when the radiographs are not diagnostic or fractures of small bones of the feet or fibula are suspected, bone scan is useful (4).

Medial oblique projection is the best view for evaluation of the cuboid in plain radiographs, which may show sclerotic change in the proximal portion of the cuboid (5).



Figure 2. Plain radiography of the right foot which shows a band of sclerosis in the proximal aspect of the right cuboid bone (arrow). This is due to healing phase of the cuboid toddler's fracture.

CT scan and MRI can also show the cuboid fracture even at early stages; however in limping child the physician should be alert about possible small foot bones fractures and make sure to request appropriate MRI or CT projections. In our case the true location of the patient's symptoms was overlooked and even radiography was not performed.

Bone scan is a useful modality for evaluation of the physiological state of the bone and (in some occasions) the soft tissue (6). The uptake patterns of the bone-seeking agent are highly suggestive of localization of trauma to bone or its adjacent soft tissue. Bone scintigraphy has a high contrast, which enables the detection of trauma at an early stage even before structural changes on conventional radiology. Bone scan is also an ideal exam for detecting complication of the trauma such as reflex sympathetic dystrophy and nonunion (7).

The bone scanning is especially invaluable in a child with sign and symptoms suggestive of inflammation such as refusal to walk and/or unexplained leg pain (2). Fractures of

the calcaneus, talus and cuboid bone could be detected by bone scan very easily (2). Simonian et al reported eight cuboid fractures which were diagnosed by bone scan while the radiographs were normal at early phase and showed sclerosing at late phase. They concluded that cuboid fracture should be included in the differential diagnosis of difficult assessment of a limping child (8).

Blumberg et al reported two proven and two presumed cases of cuboid fracture in toddlers whom were being evaluated for limping following falling incidents. While initial plain X-rays were normal, bone scan revealed focal uptake in the cuboid bones. Follow up radiographs showed characteristic sclerosis of the base of the cuboid.

The cuboid fracture is another example of toddler's fracture which may be difficult to diagnose at initial physical and radiographic examination (5) as was true in our case. Tibia, calcaneus and cuboid are the most common sites of occult fracture in toddlers (4). Bone scan is almost always positive

within 24 hours after fracture (9). In children with unexplained limping, in whom plain X-rays are normal, bone scintigraphy is recommended in order to rule out occult fracture (10).

CONCLUSION

a) Foot bones fracture should always be included in the differential diagnosis of a child with limping.

b) When the cause of a child's limping cannot be localized by history, physical exams, and laboratory or preliminary imaging data, a bone scan can be an excellent procedure to help localizing the pathology.

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