



POSNA

The Core Curriculum

Fractures of the tarsals and metatarsals

Objectives

1. Describe mechanisms of injury responsible for metatarsal fractures in children.
2. Describe a treatment approach for metatarsal fractures in children.
3. Describe two variants of metatarsal fractures involving the proximal fifth metatarsal. Discuss treatment for these fractures.
4. Describe an approach to the diagnosis and treatment of stress fractures involving the metatarsals
5. Describe the location of the physis in the metatarsals.
6. Describe the diagnosis and management of compartment syndrome of the forefoot.

Discussion points

1. When, if ever, is open reduction indicated for metatarsal fractures in children?
2. How often are metatarsals fractured as the result of abuse?
3. What is the Jones fracture? What are the merits of operative and nonoperative treatment?
4. What is the os vesalianum?
5. What is the mechanism of injury for an avulsion fracture of the base of the fifth metatarsal?
6. How many compartments should be released in the presence of a compartment syndrome of the forefoot and hindfoot?

Discussion

Fractures of the metatarsals are relatively common in children. Recently, they have been described as relatively frequent occurrences in abused infants. The first metatarsal is fractured more frequently in young children; Johnson has described a fracture pattern involving the proximal first metatarsal and usually the lateral cuneiform sustained from a mechanism of injury (plantarflexion and/or abduction) similar to that of metatarsal-tarsal dislocation, which he terms the "bunk bed" fracture. Metatarsal shaft fractures are usually distal and remodel well. Angulation can be improved by hanging the toes in Chinese finger traps. Percutaneous pinning can be performed in older children with more proximal fractures if there is doubt about the ability to remodel.

The fifth metatarsal is more often injured by inversion forces. The common avulsion injury is often felt to be secondary to traction on the peroneus brevis, in fact the fracture is more proximal and probably results from tethering of the lateral plantar aponeurosis. This fracture, which is easily treated with immobilization, should be differentiated from the os vesalianum, which is a normal variant. A more troublesome fracture at the metaphyseal-diaphyseal junction is the so-called Jones

fracture, most often seen in athletic older teens or young adults. Most authors now believe that a stress reaction predated the fracture; with the result that delayed union is frequent. The blood supply is also more precarious to this region of the bone. Conflicting reports on the efficacy of conservative treatment can be found; but operative treatment can also fail. Glasgow reported that using anything but a 4.5mm malleolar screw for fixation was associated with failure. Percutaneous screw fixation has been reported as being reliable in college athletes.

Compartment syndrome of the foot is now well recognized. Crush injuries, which usually result in metatarsal fractures, predominated in the series reported by Silas. Compartment pressures were measured under general anesthesia, but if pressure monitoring is not available; clinical suspicion alone warrants release. Two dorsal and one medial approach are necessary to release the multiple compartments in the foot.

Isolated fractures of the tarsal bones are rare, crush fractures of the cuboid can accompany tarsometatarsal dislocation resulting from abduction forces, and have been reported as isolated injuries. Operative treatment seems rarely indicated.

Stress fractures of the metatarsals appear to involve children at a lesser rate than young adults. Yngve found metatarsal and tarsal stress fractures each only comprised 2% of the total reported in children. Diagnosis depends on awareness and suspicion of the entity. Treatment is rest followed by graded activity. Complications of stress fractures in the immature foot have not been reported.

References

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