



POSNA

The Core Curriculum

Fractures of the calcaneus

Objectives

1. Describe the anatomy of the calcaneus; including the articular facets and their orientation, the sustentaculum tali, and the apophysis
2. Describe the ossification of the calcaneus, and differences between the immature and adult calcaneus
3. Describe a classification system of calcaneal fractures useful for assessing such fractures in the immature foot
4. Discuss the imaging of a suspected fracture of the calcaneus, including useful views with conventional radiography, salient features of their interpretation, and/or other imaging modalities
5. Describe diagnosis and management of the toddler's fracture of the calcaneus
6. Discuss a treatment approach to displaced fractures of the immature calcaneus
7. Discuss prognosis for fractures of the immature calcaneus

Discussion points

1. What type(s) of injuring forces result in calcaneal fractures in children? Does the nature of the injuring force change with age?
2. What is the Essex-Lopresti method for reduction of displaced calcaneal fractures? Is there any applicability of this method for the immature calcaneus?
3. Should indications for open reduction of calcaneal fractures established in the adult be applied to the immature calcaneus?
4. What are the features of anterior process fractures?

Discussion

Until the early 1980's, calcaneal fractures were rarely reported in children. Since that time, a number of reports have appeared, and it is obvious that, while unusual, most orthopaedists can expect to encounter this fracture in a child at some point. The so-called toddler's fracture represents a definite subcategory where diagnosis is the major concern; treatment is simple immobilization. Localized tenderness is the key to diagnosis in a toddler who refuses to walk with an often unclear history. Bone scintigraphy has been described as helpful in diagnosis but a recent paper noted that immobilization solves the problem, and follow-up radiography will demonstrate the callus in the calcaneus.

Classically, calcaneal fractures occur as a result of axial loading. Radiographic features of calcaneal fractures are well illustrated by Harty. Classification systems based on conventional

radiography are described for children's calcaneal fractures, Schmidt and Weiner's is useful. Since CT scanning, more sophisticated classification systems of joint compression fractures have been described (Sanders).

In the young child; the lateral process of the talus, which impacts on the subtalar joint to cause so much mischief with intra-articular fractures, is less developed and the posterior talocalcaneal joint is flatter than the more mature calcaneus. Both of these features tend to lessen the severity of calcaneal fractures in children. Some capacity for remodeling is also present in the child's calcaneus. These features, combined with the relative rarity of intra-articular calcaneal fractures in children, account for the present lack of clarity in developing well defined treatment strategies for intra-articular fractures in the immature calcaneus. The present tendency seems to be toward more aggressive methods of attaining anatomic reduction, but the necessity of such methods has not been established. The adolescent probably should be treated as an adult when planning treatment, but remodeling can occur in younger children (Thomas). Percutaneous pin reduction is another possibility (Biert).

Other fractures of the immature calcaneus affect the tuberosity or anterior process. Displaced tuberosity fractures are easy to recognize and respond well to open reduction. Anterior process fractures, which result from an inversion-plantarflexion force, are more difficult to recognize, and can produce lasting disability. A modified oblique view described by Bachman and Johnson is helpful for diagnosis with conventional radiography: CT scanning is helpful in assessing displacement, open reduction is indicated for displaced fractures.

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