



POSNA

The Core Curriculum

Distal tibial physeal fractures

Objectives

1. Describe the pattern of closure of the distal tibial physis
2. Describe the mechanisms of injury causing the common variants of distal tibial physeal fractures
3. Discuss a classification scheme by mechanism of injury, and fracture pattern of the growth plate
4. Describe strategies for treatment of distal tibial physeal fractures, including indications for closed reduction, closed reduction with percutaneous fixation, and open reduction
5. Describe the triplane fracture, and its common variants

Discussion points

1. What are the relative values of using a physeal fracture pattern classification (Salter-Harris) versus a mechanistic classification (Dias-Tachdjian)?
2. Of what value is the first component of the Dias-Tachdjian(Lauge-Hansen) classification?
3. How is the triplane fracture related to the fracture of Tillaux?
4. For external rotation injuries, discuss the indications, method, and effectiveness of closed management, percutaneous fixation, and open reduction.
5. What is responsible for the increased incidence of subsequent growth arrest following adduction (supination/varus) injuries?
6. What is an acceptable criterion for reduction of distal tibial physeal fractures?

Discussion

The distal tibial physis has a consistent pattern of closure, with the medial "hump" closing first, followed by the lateral physis. At a particular point, when the medial physis is closed, but the lateral is not; and external rotation injury can, in effect, avulse the anterolateral portion of the distal tibia from the remaining portion. This is the "fracture of Tillaux." This is also a portion of the triplane fracture, which is essentially an extension of the fracture of Tillaux, fracturing the distal tibial metaphysis in the sagittal plane as the externally rotating anterolateral fragment continues to peel off the tibia. Internal rotation, with or without screw fixation, is the cornerstone of a successful reduction.

Classification schemes have been described for distal tibial physeal fractures for close to a century, and none have meaningfully improved on Ashhurst's simple choices of external rotation, abduction, or adduction, described in 1922. The adduction injury, where the medial talus impinges into the ankle mortise at the junction of medial malleolus onto tibia, has the poorest prognosis for

subsequent growth arrest, probably as the physis is compressed as it is fractured. The Salter-Harris classification is less helpful for prognosis for distal tibial injuries than for other sites. Histologic studies have demonstrated that the fracture cleavage through the physis in, for example a Type II Salter-Harris fracture resulting from an abduction force can meander through all zones of the growth plate.

Since external rotation injuries involving the physis injure a physis already in the process of closure, growth disturbance is not a factor, and the criterion for an acceptable reduction is exactly the same as it would be for an adult intraarticular ankle fracture. For other fractures of the open physis, anatomic reduction is preferred with internal or percutaneous screw fixation (for the fracture that can be easily reduced, but not easily held in cast) not crossing the growth plate. When the quality of reduction is in any doubt following closed treatment, CT scanning is very helpful. MRI scanning has been recommended for early detection of growth disturbance following growth plate fracture.

References

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