

The Physis: Understanding the Pediatric Growth Plate

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Objectives

- a. Differentiate between physes in the pediatric skeleton.
 - b. Identify principles of physeal development.
 - c. Demonstrate understanding of the physis' role in pediatric growth in regard to injury.
 - d. Discuss treatment and management of physeal injuries including sequelae
- A. Anatomy/Physeal Analysis
- a. Histology/pathology of bone formation in the skeleton
 - i. Endochondral ossification versus intramembranous ossification
 1. Including 1 examples of physis that demonstrate each principle
 2. Blood supply
 - b. Physeal locations throughout the pediatric skeleton
 - i. Including 1-3 examples of physeal change throughout growth
 - c. Physeal development
 - i. Principles
 1. Method for determining lower extremity growth/discrepancy (3,6,9,5 mm/yr)
 2. CRITOE mnemonic for growth plates in the elbow
 - d. Remodeling of fractures in children
 - i. 1 example of physeal injury and remodeling
- B. Physeal Abnormalities
- a. Trauma/Injury
 - i. Physeal Fractures
 - b. Infection
 - c. Angular Deformity
 - i. Acquired (trauma)
 - ii. Congenital
- C. Evaluation
- a. History
 - i. Need to know mechanism of injury
 1. High energy activities yield high energy injuries
 - ii. DDx
 1. Infection, trauma, child abuse, ligamentous injury, neoplastic disease
 - b. Exam

- i. Neurovascular exam
- ii. Physical exam
 - 1. Joint above and below
- iii. Imaging
 - 1. Radiographs
 - a. What to order
 - b. Salter Harris classification
 - 2. Advanced imaging
 - a. MRI for questionable ligamentous injury or infection
 - b. CT
 - i. 3D bony evaluation
 - ii. Can also order angiography for evaluation of vascular structures in high energy trauma

D. Treatment

- a. Displaced versus non-displaced
- b. Non-operative versus operative

E. Sequelae

- a. Physeal Bar
- b. Cozen's deformity
- c. Avascular necrosis
- d. Malunion/nonunion
- e. Infection

F. Pearls

- a. Growth arrest can occur, patient's and family need to understand this
- b. In all pediatric patients, it is essential to look for signs of child abuse and to report it.
- c. Make sure to perform a thorough neurovascular exam as well as check the skin for any evidence of open fracture.
- d. Initial reduction is important, but be mindful that multiple reductions can increase the risk of injury to the growth plate