



5º CURSO INTERNACIONAL DE ORTOPEEDIA PEDIÁTRICA
 POSNA – SLAOTI – EPOS
 12 – 14 OUTUBRO 2017
 SÃO PAULO – BRASIL



Physeal, sleeve, tibial spine and tuberosity fractures about the knee

Dr. Javier Masquijo
 Departamento de Ortopedia y Traumatología Infantil
 Sanatorio Allende, Córdoba - Argentina



Disclosures

- None

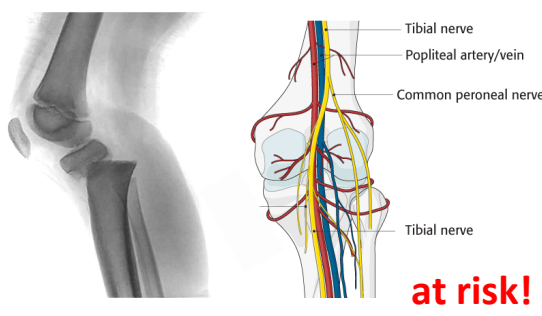
Introduction

- Growing skeleton make children susceptible to specific fractures
- Complications can be catastrophic
- Understanding of the anatomy, physical examination and diagnostic workup is critical

(1) Physeal fractures

- Distal femoral fractures 2-5%
- Proximal tibial 1%
- Mechanism of injury
 - High- or low-energy
 - MVA or sports

Neurovascular examination is crucial

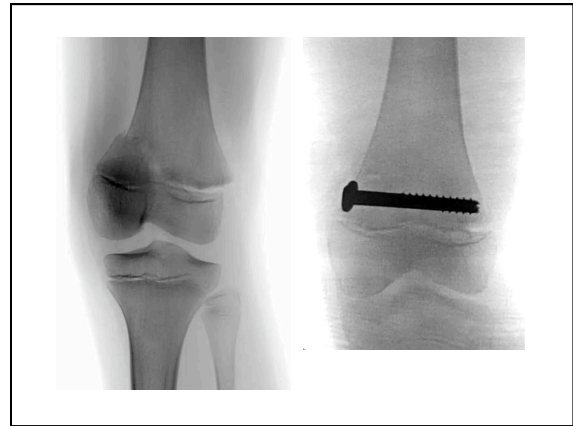


Tibial nerve
 Popliteal artery/vein
 Common peroneal nerve
 Tibial nerve

at risk!

Salter-Harris I-II

- Most common
- Nondisplaced (<2mm)
 - Long leg cast 4-6 weeks
- Displaced
 - CRPP
 - ORIF if closed reduction is unsuccessful (periosteal flap interposition)



Salter-Harris III - IV

- ORIF cannulated screw fixation parallel to the physis

Key Point:
Anatomic reduction
Close monitoring for growth arrest

Complications

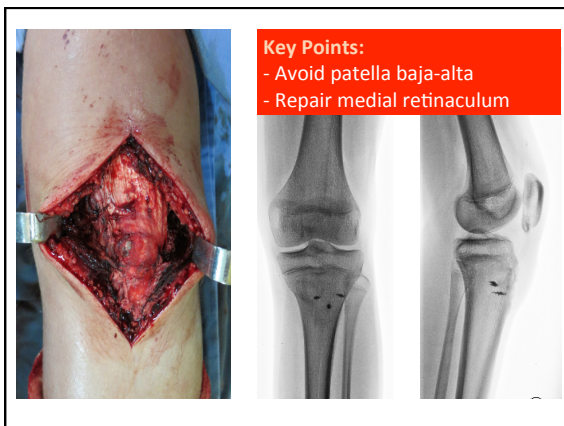
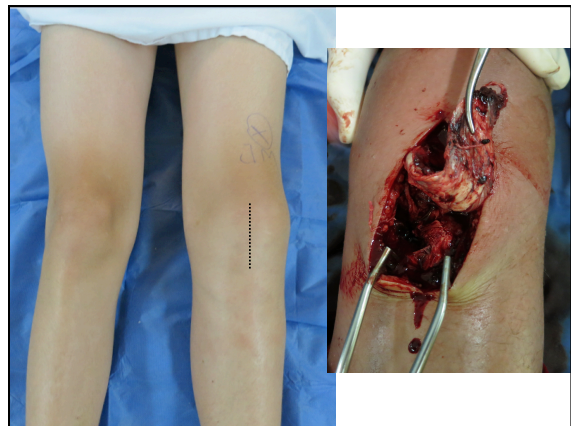
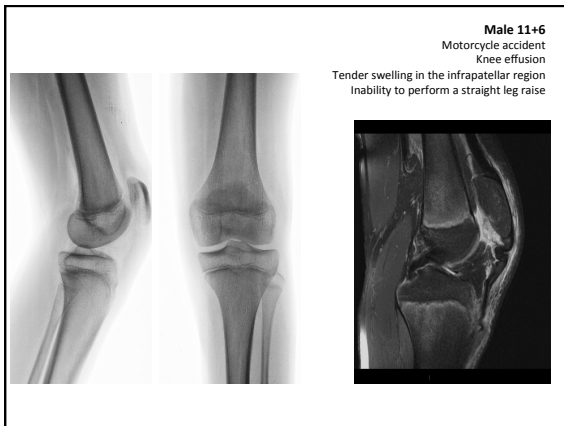
- Growth arrest
 - Distal femur 40-90%
 - Proximal tibia 25%
 - Correlates with fracture pattern and patient age
- Neurovascular injury
- Compartment syndrome
- Infection (open fractures)

(2) Sleeve fractures

Skeletally immature boys, before complete ossification of the patella

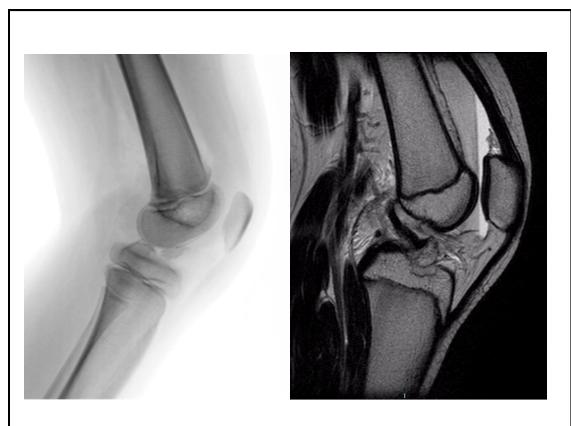
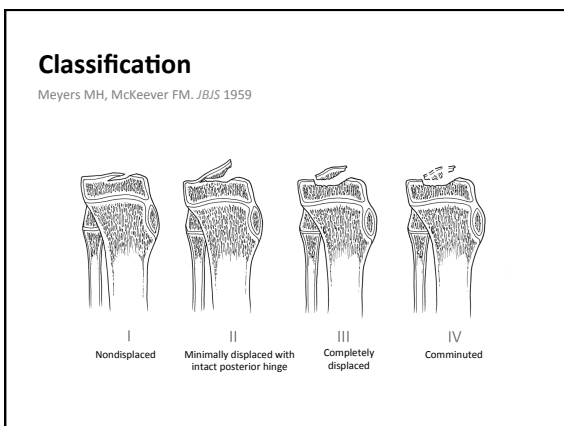
(2) Sleeve fractures

Proximal pole ++
Distal pole +++
Tibial metaphysis +




(3) Tibial spine fractures

- Relatively rare (3:100.000 children-year)
- 2% of all knee injuries in children
- 8–14 years




Treatment

Approach



Arthroscopy Mini-open

Fixation




Similar results
Edmonds EW, et al. JPO 2015.

Key Points

- Don't miss associated injuries
- Stable fixation
- Aggressive rehabilitation

Complications

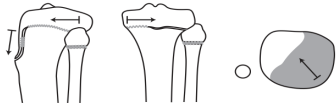
- Arthrofibrosis
- Instability
- Nonunion
- Malunion
- Physeal arrest



Reed Estes A. *Am J Orthop.* 2015;44(5):E160-E164.

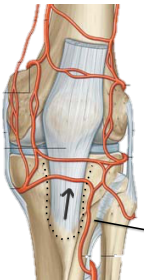
(4) Tibial tubercle fractures

- 1% of physeal fractures
- Adolescent boys 12 to 17 years
- Apophysis closes from proximal to distal
 - Vulnerable area



Key Point I:


Beware of compartment syndrome



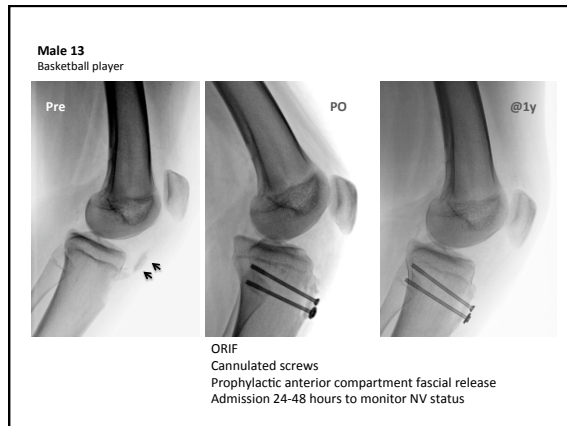
Anterior tibial recurrent artery
at risk!

Key Point II:

Rule out intra-articular involvement



Advanced imaging is recommended
Pandya NK, et al. *J Pediatr Orthop.* 2012



Take home message

- Relatively rare injuries in children
- Most require surgical intervention
- Some fractures are associated with acute and late complications
- Close monitoring for any neurovascular signs or compartment syndrome
- Patients with high risk physeal fractures should be monitored for growth disturbance