Management of distal femoral physeal injuries

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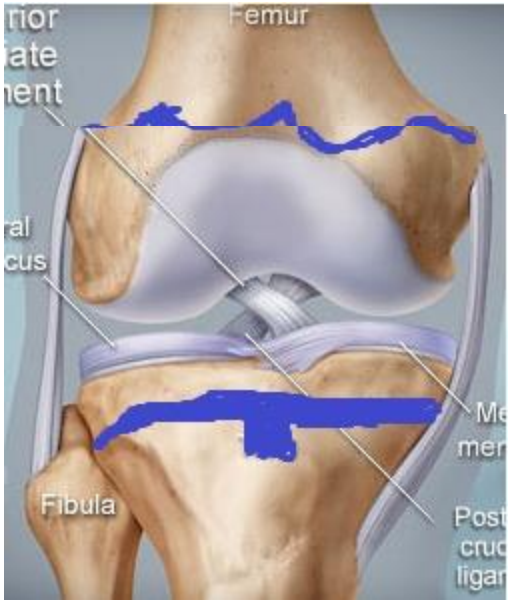
Objectives

- Key clinical points before fracture treatment
- Advanced imaging, CT?, MRI?
- Reduction, closed? open? Arthroscopic?
- How to deal with meniscal/ ligamentous injuries?
- How to follow up?

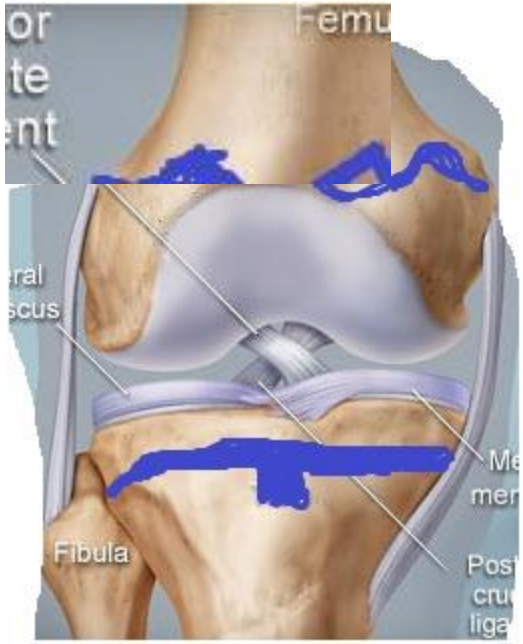
Wagon-wheel, Cart-Wheel

- 70% femoral length
- 37% lower extremity

Type I

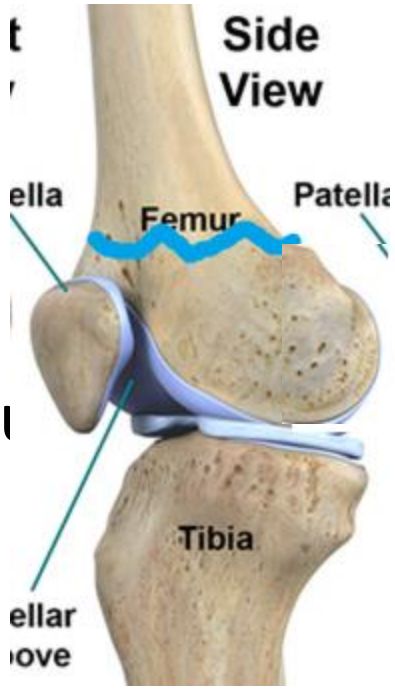


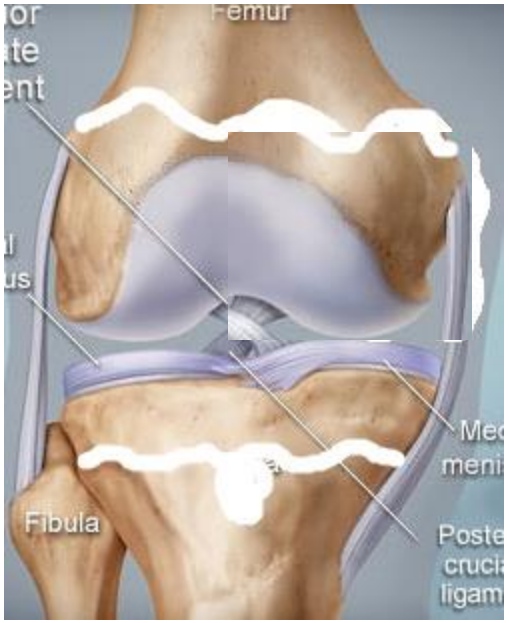
Type II



Type III

- Medial
- ACL
- MCL
- Menisc

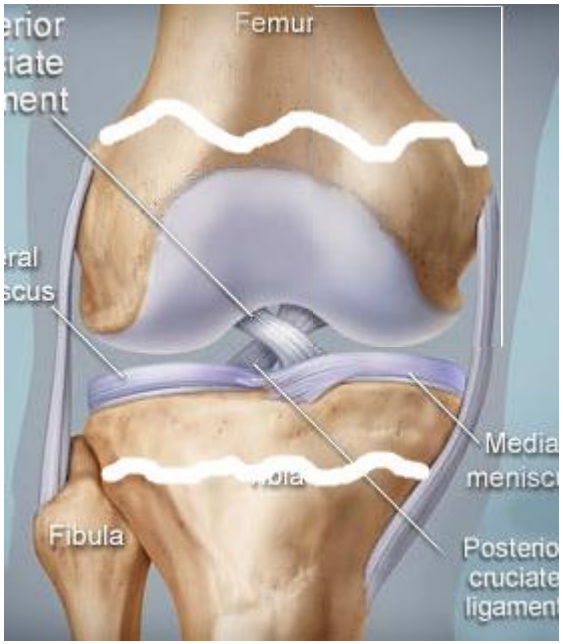




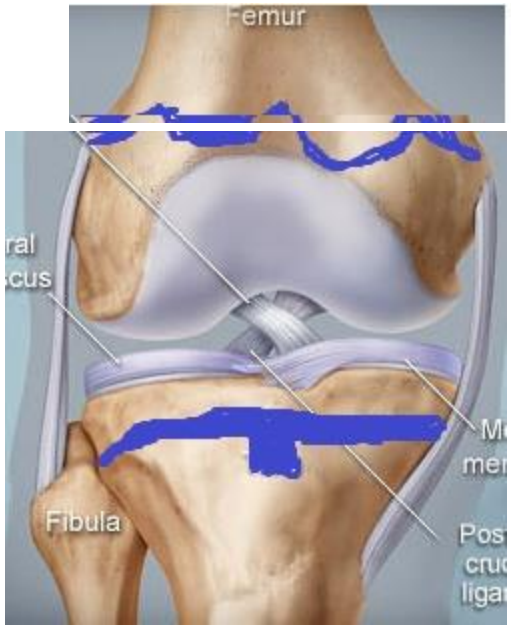
Salter–Harris III Fractures

- 10% of all DFPF
- Older children and adolescence
- Most involve medial physis
- May have injury to the cruciate ligaments

Type IV



Type V



Not isolated

- Visceral injuries in 5%

- Musculoskeletal injuries in 10% to 15%

Most common concomitant musculoskeletal Injury

- 3-7% major vascular & peroneal nerve injury
- Knee ligament disruption
- Meniscal injuries

Vascular injury

- Even in minimally displaced fracture
- No angiography with normal function, pulses, warmth, and color
- Monitor closely during the initial 48 to 72hs

The principles of treatment

- A careful neurovascular examination
- Evaluate for compartment syndrome
- Evaluate other extremities, pelvis, and spine

The goal of treatment

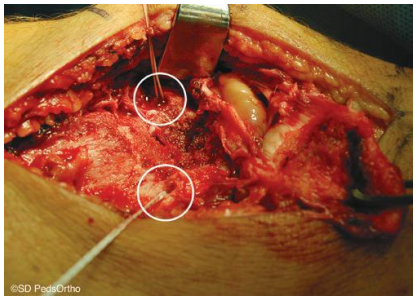
- Anatomic reduction
- stable fixation, especially (>10 years)
- In a younger child,

  Up to 20 degrees sagittal angulation

  5 degrees of varus or valgus

  No rotational deformity

The principles of treatment



- Anatomic reduction
- Remove interposed tissues
- Fat grafting
- Avoiding iatrogenic damage to the physis
- Secure stabilization

Cast immobilization

- Nondisplaced fractures
- Obtaine the x-rays within 4 to 5 days

Closed Reduction and Screw Fixation

- Minimally displaced
- Careful and accurate assessment of intraoperative imaging
- Arthroscopy

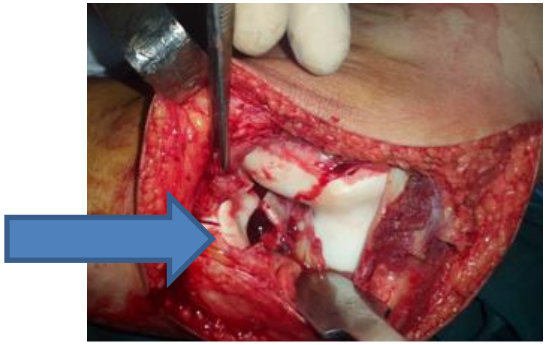
Displaced

- Open reduction with internal fixation
- Cancellous screw (4.0- or 6.5-mm)
- Cast for4 to 8 weeks (20-30 flex)
- Early motion can be started at 4 to 6 weeks

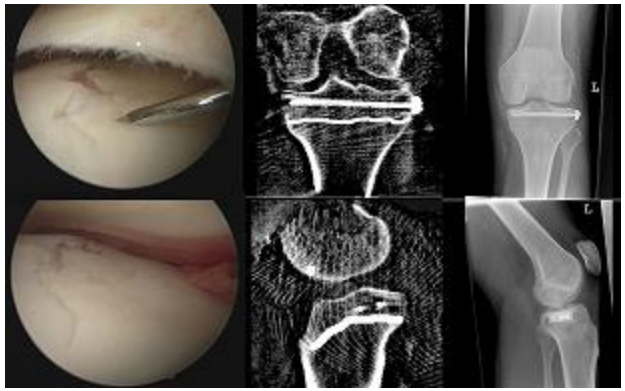
Evaluation of reduction

- Fluoroscopy (C-Arm???)

- Arthrotomy



- Arthroscopy



Outcome

- Age < 11 , high energy poor
- Displacement
- Inadequate red/ fix
- Type 3, 4, 5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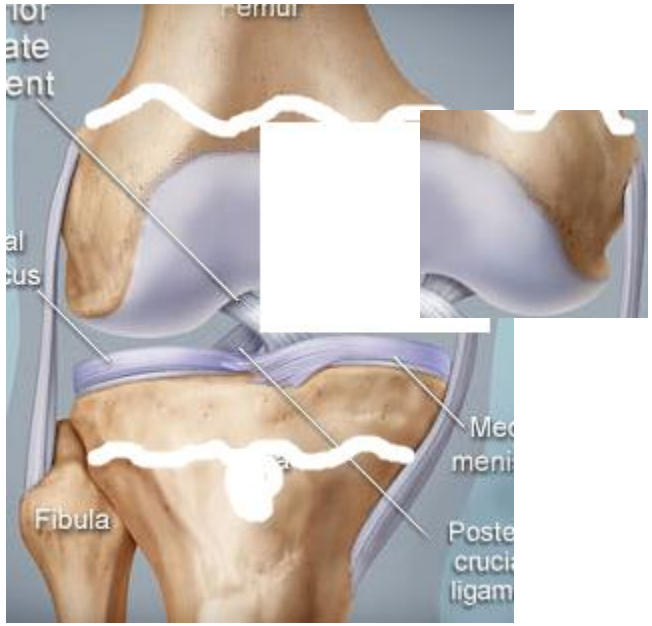
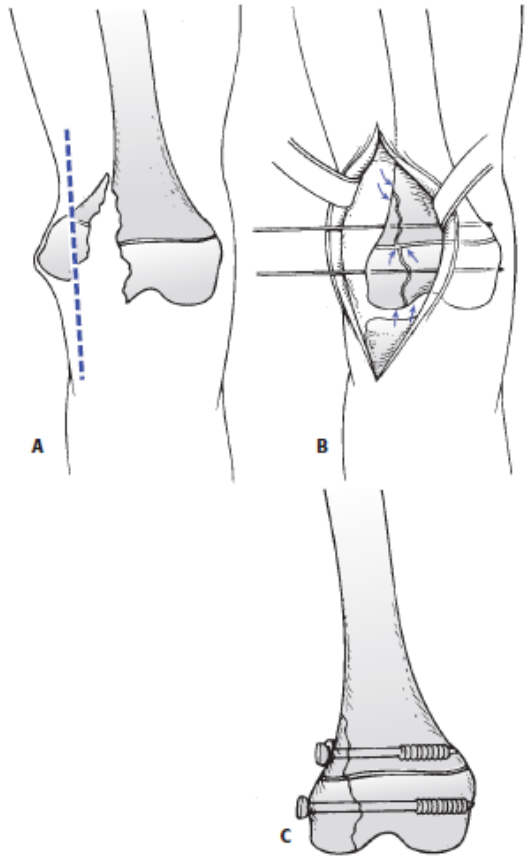

Fibula


A
B
C

After internal fixation

- Valgus stress for MCL

- No arthrotomy Gentle Lachman test for ACL

- X -rays at 1 week post-reduction
- Return to activities 4 wks following cast
- Physis sassed 4 - 6 mo via X-ray/ ***some MRI***

Intra-articular injuries

- ***ACL***

  → After the fracture has healed

  → Full ROM

- ***Meniscus*** may be repaired primarily

Late Displaced type III and IV

- For all ages open reduction is recommended as soon as possible

CT scans/ MRI

- CT always
- MRI is not recommended at acute setting

Device removal

- At 1-month visit remove pins
- 4 months (facilitating MRI)

Take home message

- Careful clinical assessment
- Complete diagnostic imaging
- Anatomic reduction
- Avoid further physeal injury
- Secure maintain reduction
- Follow-up until skeletal maturity(Q 6 mo)