



Ep 32- Pediatric Hip Pain - Dr. Joseph Gonzales

- Posterior inferior migration of epiphysis thru physis of proximal femur
- Acetab retroversion and small pelvic incidence may be assoc w/ SCFE
- through the zone of hypertrophy. Widened hypertrophic zone. disrupted chondrocyte differentiation
- Metabolic disorders: obesity, hypothyroidism, kidney failure

Clinical presentation

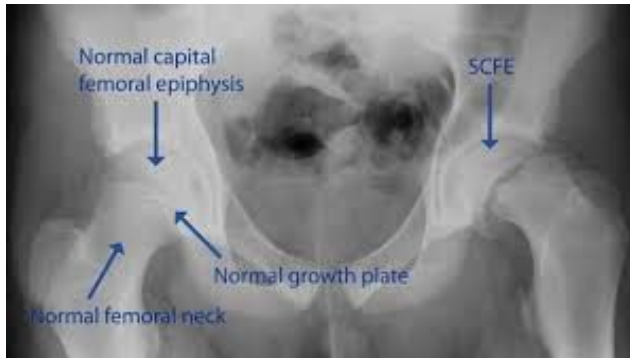
- obese, adolsecnt, boy
- poorly localized hip/groin/thigh/ knee pain. possible limp

Classification- stable v unstable- ability of pt to walk

- Stable SCFE appearance
 - limp +/- gait w/ ER of foot, limited IR of hip, or Drehmann sign - flexed hip position with external rotation
- Unstable SCFE appearance
 - hip pain that doesn't allow gait, hx + for hip/thigh/knee pain and previous trauma
 - obligatory ER of the hip with passive flexion past 90 deg
- Acute v chronic v subchronic
 - Acute- <3wk of sxs
 - Chronic- sxs > 3 weeks
 - Acute on chronic- sudden exacerbation of pain +inability to walk w/ lower-limb pain for >3 wks



Pre-op evaluation



- Ap pelvis + frog leg lateral
- Radiographic findings include:
 - widening of physis
 - relative decreased height of epiphysis
 - loss of intersection of epiphysis by a lateral cortical line along femoral neck (Kleins line)
 - Double density detected at metaphysis (Steel sign- caused by posterior slip of epiphysis)
- Southwick method
 - angle between head and femoral diaphysis. on AP. compare w/ contralateral
 - slight sliding- angles differ by <30 degrees
 - Mild- angle between 30-60deg
 - Severe >60 deg
- Advanced imaging
 - MRI- detect AVN, chondrolabral defects, periarticular bone edema
 - MRI can also target joint effusion, synovitis, and bone marrow edema as indirect measures of epiphyseal stability
 - CT- estimates accuracy of entity of dislocation
- AVN rates- can be up to 50% in unstable SCFE
 - inc in capsular pressure leads to reduced blood flow to epiphysis to compression/overstretching/kinking/tearing of posterior retinacular blood vessels at the time of injury, or during reduction and fixation of dislocated epiphysis



- Epiphyseal stability is key- Ziebarth et al - intraoperative classification on whether physeal integrity is intact or disrupted.
 - physis-stable- if periosteum was intact and several cuts needed to separate epiphysis during modified dunn procedure

Treatment



- In situ fixation
 - Percutaneous fixation of epiphysis.
 - goal to prevent increase of displacement until closure of growth plate.
 - Many methods- 1 cannulated screw to 3/4 K-wires
 - Want screw in center of neck and perpendicular to growth plate
 - more anterior starting point is required to cross physes perpendicular
 - avoid superolateral screw placement- inc AVN- affects perfusion coming from lateral epiphyseal vessels
 - of 2 screw design- place first screw ideal and other in inferolateral quadrant
 - dont use titanium screw? high removal failure- bone grows over head of screw
 - use fully threaded screws?
- Prophylactic pinning
 - controversial. Only in select pts, very young children, + endocrinopathy, obese pts, w/ difficult follow up



- should we really pin radiographically and clinically normal hips?
- Compensatory osteotomies
 - poor results
- Surgical hip dislocation (the modified dunn procedure)
 - posterolateral dissection of retinaculum> allows trimming of callus formation at posterior neck + adding a trochanteric osteotomy to do the procedure.
 - space from head-neck junction to axilla w/ GT is narrow> allows for control of retinacular tension during callus removal.
 - this technique allows anatomic reorientation of epiphysis, protecting retinacular vessels and epiphyseal vascularization

Legg-Calve-Perthes



- One of the most common causes of permanent femoral head deformity in childhood

History -

- often in children between ages 4 and 8 yo (More common males and Caucasian)
- A painless limp with ambulation



- Possible to complain of pain at the hip , groin, or knee
- Often with limited Internal rotation
- Possible trendelenburg gait

Anatomy

- Not clearly known whether a single episode or multiple episodes of infarction produces LCP disease
- Affects the articular cartilage, epiphysis, physis and metaphysis of the femur.
- Ischemia leads to changes in the soft tissue and muscle spasms which leads to **lateral extrusion of the femoral head**
- The affected region becomes necrotic and is resorb by osteoclast during the repair process leading to compromise of the mechanical properties of the femoral head
- Joint loading is thought to increase deformity of the femoral head as well
- Ischemia, decreased mech props, joint loading

Imaging





Radiographs are mainstay for diagnosis. Natural evolution can be clearly identified

AP and frog lateral - observe changes to the femoral head

Stages of LCP:

Described by Waldenstrom

1. Initial stage
2. Fragmentation
3. Reossification
4. Healed

Before deformation vs After deformation

| TABLE I Lateral Pillar Classification System | |
|--|---|
| Radiographic Findings | |
| A | No involvement of lateral pillar, with full height maintained |
| B | >50% of lateral pillar height maintained |
| B/C* | Thin or poorly ossified lateral pillar, with loss of 50% of lateral pillar height |
| C | <50% of lateral pillar height maintained |

*Modification introduced by Herring et al. in 2004^{1,26}.

Treatment -

Attempt to prevent the femoral head deformation in the early stages of the disease

Consider Age of the child at the onset of symptoms

Presence of extrusion of the femoral head

Hip ROM



Stage of evolution of the disease

| Variable | Contain | Don't contain |
|-----------------------------------|-------------------------|---------------------------|
| Age | >7 or <7 with extrusion | <7 (no extrusion) |
| Stage of evolution of the disease | Stage Ia, Ib, IIa | Stage IIb, IIIa, IIIb, IV |
| Extrusion | Present | Absent (<7 years) |
| Range of hip motion | Normal | Restricted |

- Containment; joint preserving surgery
 - A. Casting, Bracing
 - B. Pelvic Acetabular Osteotomy (Salter osteotomy, triple innominate osteotomy, etc)

In the later stages of the disease , may require valgus femoral osteotomy to help allow a more congruent surface of the femoral head under the acetabulum and reduce hinging

