

Evaluation of the Limping Child

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CASE # 1

Hx – 2-year-old boy limps
because of pain in the right
lower extremity (antalgic)

PE – pain and swelling
involving the right leg

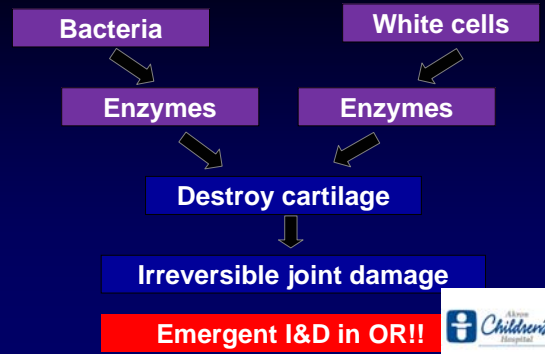


Differential Diagnosis

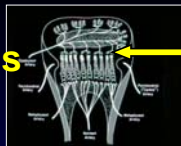
- Bone infection (osteomyelitis)
- Joint infection (septic arthritis)
- Toxic synovitis
- Fracture (toddler's)



Septic Arthritis



Osteomyelitis

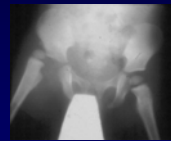


- Hematogenous origin
- Metaphyseal origin
- Vessels cross physis until 12-18 mo
- hip>shoulder> elbow>ankle metaphysis is in the joint capsule
- Physis and periosteum protect joint from osteomyelitis in older children



Septic Arthritis

- Metaphyseal osteomyelitis can decompress into a joint → septic arthritis
- Multifocal neonates
- Septic joint dislocation (rare)



Clinical Findings

- Localized pain & swelling
- Systemically ill
- Fever
- Irritable
- Refusal to bear weight
- Pseudoparalysis



Laboratory Studies

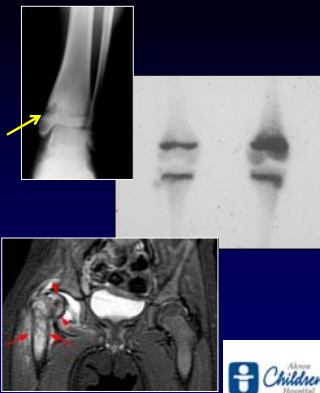
- Elevated WBC, ESR, & CRP
- 10-50% Positive blood culture
- Synovial WBC > 50K, gm st, cx
- bacteriology:

staphylococcus aureus most common
Group B streptococcal & haemophilus influenzae,
Salmonella
Pseudomonas aeruginosa
gram-negative organisms (N. gonorrhoea)



Imaging

- Radiographs
 - Soft tissue swelling
 - Lytic area
- Bone scan
 - neonates
- MRI
 - abscess



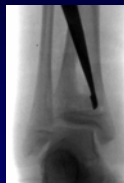
Diagnosis/Treatment

- Aspiration is the “key” to the diagnosis
 - Aspirate joint
 - Subperiosteal aspiration
 - STAT synovial cell count, gram stain



Treatment

- Emergent surgical debridement, open periosteum, drill cortex
 - Intraoperative cultures
 - Repeat I&D, drains left in
- IV antibiotics



Toddler's Fractures

- Childhood Accidental Spiral Tibial (CAST) fractures Dunbar 1964
- Cuboid, calcaneus 1st metatarsal
- 9mo-3yr
- Minimal trauma



CASE #2

Hx – 18 month-old girl limps on the left leg (no pain)

PE – left lower extremity is shorter than the right



Differential Diagnosis

- Developmental dysplasia of the hip (DDH)
- Limb-length discrepancy (LLD)



DDH- terminology

- Stability/Instability
- Subluxation
- Dislocatable
 - Barlow +
- Reducible dislocation
 - Ortolani +
- Irreducible dislocation
 - Ortolani and Barlow –
- Acetabular Dysplasia



Etiology: Multifactorial

- Genetic whites, + family hx
- Physiologic girls
- Mechanical breech, 1ST born
- Environm'l swaddling



Barlow Test “Dislocatable”

- Usually < 3 mo
- Dislocates hip
- Inherently more stable
- Hip is IN at rest

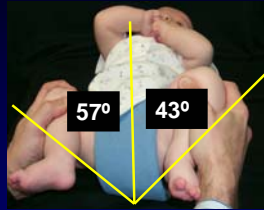


Ortolani Test “Reducible”

- Usually < 3mo
- Reduces dislocated hip
- Inherently less stable
- Hip is OUT at rest



DDH PE > 3 Months



- Limited/asymmetric hip abduction
- Ortolani and Barlow may be -



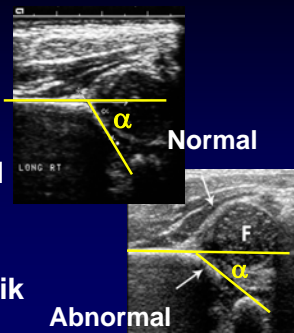
PE > 3 Months

- Asymmetric thigh/gluteal folds
 - Limb-length discrepancy
- Galeazzi sign:
 - Unequal knee heights



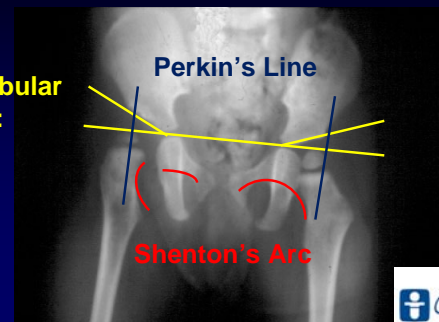
Ultrasound <3 mo old

- Alpha Angle α
 - Depth of bony acetabulum
 - $>65^\circ$ is WNL
- Percent femoral head coverage
 - $>50\%$ is WNL
- Efficacy of Pavlik harness tx



Radiographs >3 mo old

Acetabular Index:
birth $>27^\circ$
2yr $<20^\circ$



DDH Treatment Pavlik Harness

- Dynamic splint flexion/abduction
- Success:
 - Dislocated 80%
 - Dysplasia 97%
 - Uni vs. bilateral DDH
 - Early tx <7 wks
 - Initial stability on PE



DDH Treatment

- Rigid Hip Abduction Brace
- Closed vs. Open reduction in OR + spica cast application



Limb Length Discrepancy

- Etiology
 - Congenital hemimelia
 - Hemihypertrophy
 - Post traumatic (fx)
 - Post infectious
 - Idiopathic



Treatment for Limb Length Discrepancy

- Lifts (<2.5cm)
- Epiphysiodesis
 - Slow down growth of long limb
- Limb Lengthening
- Limb Shortening
 - 3" femur, 2" tibia



CASE #3 Hx – 6-year-old boy limps on the right leg

PE – limp with painful
range-of-motion of the hip



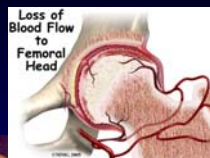
Differential Diagnosis

- Legg-Calvé-Perthes disease
- Toxic synovitis vs. Infection
- Trauma



Legg-Calvé-Perthes

- Temporary loss of blood supply of the proximal femoral epiphysis
- Ages 4-10
- Boys > Girls
- Bilateral 10%



Legg-Calvé-Perthes

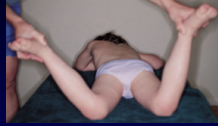
- Symptoms
 - Pain in the groin, thigh or referred pain to the knee
 - Limp
 - Pain aggravated by exercise



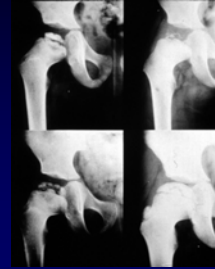
Legg-Calvé-Perthes

- Physical examination

- Decreased prone internal rotation
- Decreased hip abduction
- Irritable hip



4 Stages of Perthes



Legg-Calvé-Perthes

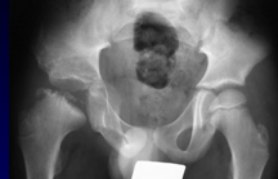


Necrotic stage

Fragmentation stage



Legg-Calvé-Perthes



Reossification stage

Remodeling stage



Legg-Calvé-Perthes disease Treatment

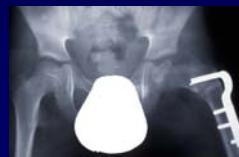
- Traction
- Physical therapy
 - ROM & abduction exercises
- Abduction brace



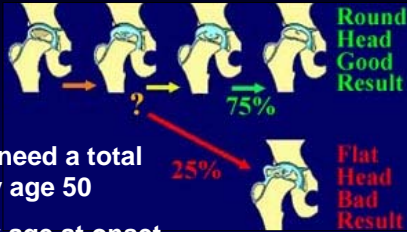
Scottish Rite Orthosis

Legg-Calvé-Perthes disease Treatment

- Adductor tenotomy + Petrie cast
- Osteotomies



Prognosis LCP disease

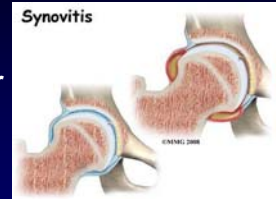


- 50% need a total hip by age 50
- Early age at onset
- Radiologic predictors



Toxic/Transient synovitis

- History:
 - Sudden onset
 - Pain in groin or thigh
 - Painful limp or refusal to WB
 - Boy > girl
 - Ages 3-10



Toxic/Transient synovitis

- Common causes:
 - Recent viral URI
 - recent hip injury/trauma
 - rheumatoid arthritis
 - collagen diseases
 - malnutrition/vitamin deficiency



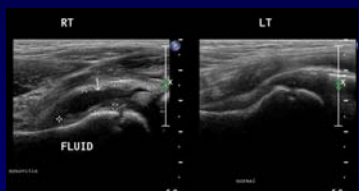
Toxic synovitis

- Physical Exam:
 - Limp
 - + “log roll test”
 - Irritable hip with guarding
 - Position of comfort
 - Mimics septic hip



Toxic synovitis

- Evaluation:
 - H&P!!!
 - CBC, ESR, CRP
 - AP, frog PELVIS
 - Bilateral hip U/S
 - Rare MRI



Toxic synovitis Treatment

- Activity modification- rest!
- NSAIDS ATC (not Tylenol)
- +/- home/inpatient traction
 - Expect improvement
 - Short duration
 - Question diagnosis if not responding



Synovitis vs. Septic Hip

- **4 Kocher Criteria:**
 - non-weight-bearing, ESR>40, fever, WBC>12,000mm³
 - 4/4 criteria - 99% chance septic joint
 - 3/4 criteria - 93% chance septic joint
 - 2/4 criteria - 40% chance septic joint
 - 1/4 criteria - 3% chance septic joint

*J Bone Joint Surg Am. 1999; 81:1662-70
J Bone Joint Surg Am. 2004; 86:1629*



CASE #4

Hx – 14-year-old obese boy has pain in the right knee and limps

PE – no swelling and full ROM of the knee but decreased internal rotation of the hip

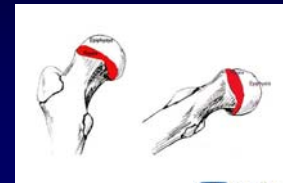
Differential Diagnosis

- Slipped Capital Femoral Epiphysis (SCFE)
- Trauma (pelvic avulsion fx)
- Knee pathology (OSD, sports inj)



Slipped Capital Femoral Epiphysis (SCFE)

- Most common hip disorder in adolescents
- M:F 3:1
- Age
 - Boys 14 y/o
 - Girls 12 y/o



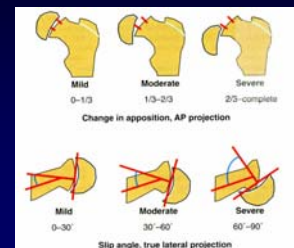
SCFE Etiology

- Mechanical
 - 63% > 95th percentile weight
- Endocrine
 - Hypothyroid
 - HGH treatment
- Puberty/Rapid growth



Slipped Capital Femoral Epiphysis (SCFE)

- Stable vs. Unstable
- Acute vs. Chronic
 - acute on chronic
- Severity of slip



SCFE Bilaterality

Out of 100 patients:

- 10 are bilateral at presentation
 - 10 will slip on the C/L side within next 12-18 mo
 - 5 will have painless slips on the other side
- Controversy: pin contralateral side?**



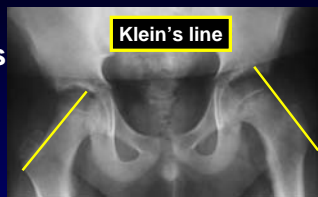
SCFE Physical Exam

- Obligate abduction & external rotation with hip flexion
- Externally rotated gait
- Limp or unable to WB



AP Pelvis X-ray SCFE

- Wide & irregular physis
- Epiphysis at or below Klein's line



PLEASE: Order "AP & FROG PELVIS" never "R or L HIP"

SCFE- Klein's Line

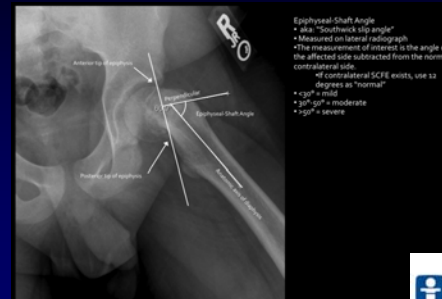


Frog Pelvis X-ray SCFE

- Posterior slip
- Chronic remodeling
- Southwick angle
- Wide, irregular physis

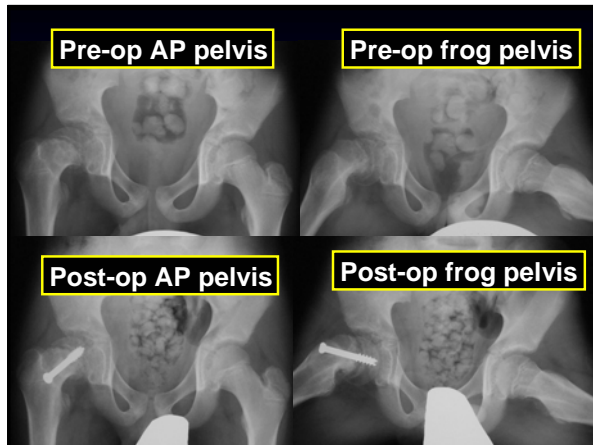
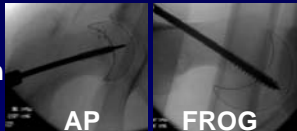
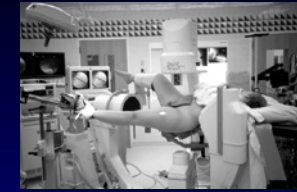


Southwick Angle Epiphyseal Shaft Angle



Surgical Treatment SCFE

- In situ pinning SCFE
 - unstable
 - 2 pins
 - Decompress
 - Stable
- Surgical dislocation & open reduction



SCFE Complications

- Loss of range of motion
- Osteonecrosis/AVN
 - stable 1% unstable 50%
- Chondrolysis
 - <8%, 2° pin penetration
- Degenerative arthritis



Pelvic Avulsion Fractures

- Forceful muscle contracture
- Apophyses
- Adolescents
- Track, soccer
- Conserv tx



Adolescent Knee Pain

- Osgood Schlatter's
- Patellofemoral
- Jumper's knee
- Sports injuries-ACL, PCL, MCL, LCL, meniscus



THANK YOU!

