APPROACH TO A LIMPING CHILD: PEDIATRIC ATRAUMATIC HIP CONDITIONS

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DISCLOSURES

- No relevant commercial relationships to disclose

LEARNING OBJECTIVES

- Recognize the critical components of a focused history and physical in a child with a limp
- Review physical exam techniques for evaluating hip pain
- Identify red flags in a child with a limp
- Interpret imaging and laboratory results for various hip conditions
- Determine the urgency for referral and management for pediatric hip conditions discussed

PEDIATRIC LIMP

History and Clinical Presentation

- History of trauma
- Age of onset and duration
- Birth history
- Pain description
- Fever, systemic, or constitutional sx
- Limp characteristics
- Additional musculoskeletal history

Trauma is the most common cause

PEDIATRIC LIMP

Physical Exam

- Observation with gait evaluation
- Inspection
- Limb length discrepancy
- Tenderness with palpation
- Range of motion
- Neurovascular exam
- Specialized tests
- Abdominal, genitalia, and/or spine exams may be indicated

Hip Pain:
Presents in the groin
May refer to thigh or knee

DDX

- Congenital
  - Hip Dysplasia
- Infectious
  - Septic Arthritis
  - Osteomyelitis
  - Psoas Abscess
- Inflammatory
  - Transient Synovitis
  - Rheumatologic
- Musculoskeletal
  - Legg-Calve-Perthes
  - SCFE
  - Stress Fx
- Neoplastic
  - Osteoid osteoma
  - Malignancy
- Other
  - Intra-abdominal or genitourinary
  - Sickle cell

DEVELOPMENTAL DYSPLASIA OF THE HIP

DDH

Most common orthopaedic disorder in newborns

- Pathophysiology: maternal/fetal laxity, genetic laxity, and intrauterine malpositioning

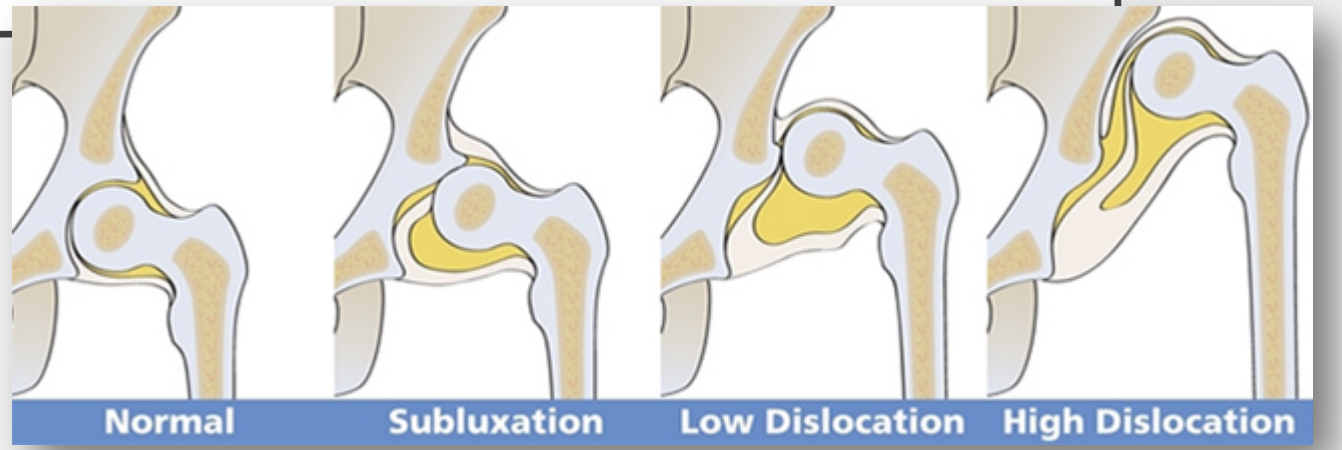
DDH

Epidemiology:

- Left hip most commonly affected (bilateral >20%)
- Risk factors are key:
  - Female > male 8:1
  - 1st born, breech position and family history
  - Swaddling is also strongly associated

DDH

- Disease spectrum:
  - Dysplasia
  - Subluxation
  - Dislocation

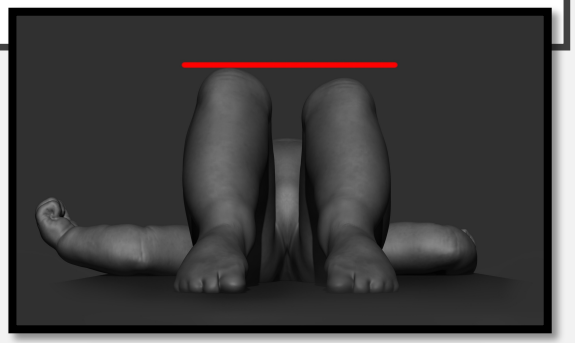


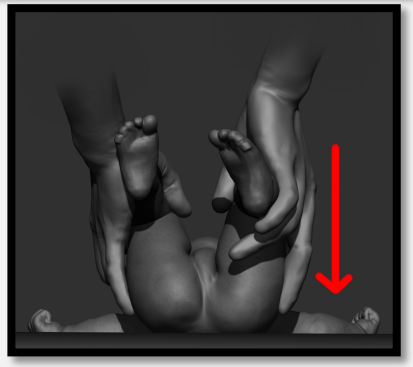
DDH Spectrum

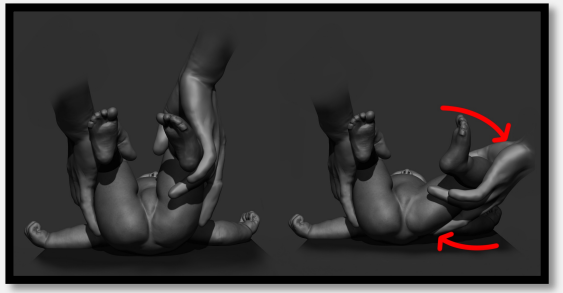
- Associated conditions:
  - Congenital muscular torticollis
  - Metatarsus adductus

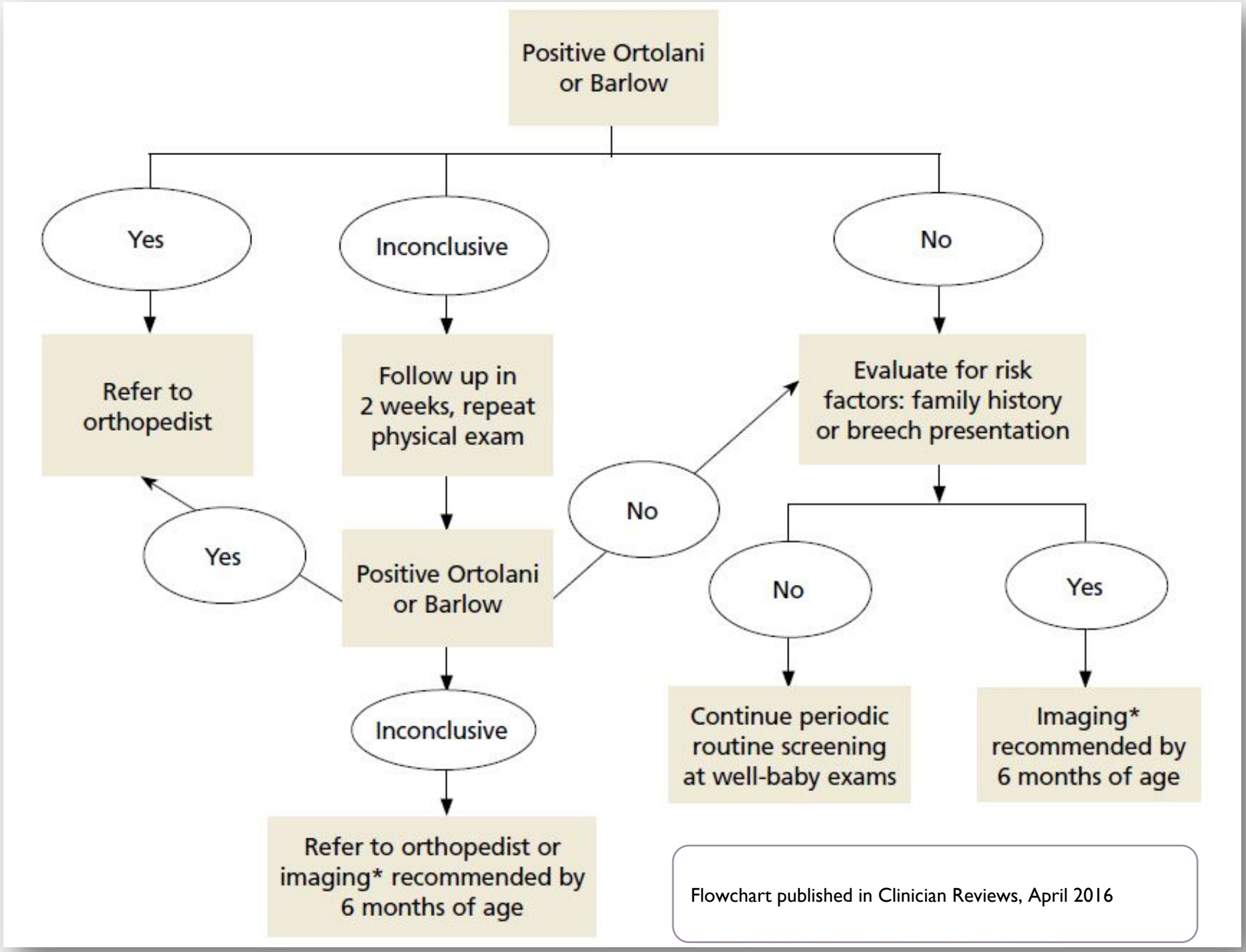
DDH: PHYSICAL EXAM

- Galeazzi:
  - Apparent limb length discrepancy while supine and knees flexed at 90 degrees
  - May be consistent with unilateral dislocated hip
- Barlow:
  - Provocative maneuver
  - Flexion, adduction, and provide posterior pressure to the joint
- Ortolani:
  - Reductive maneuver
  - Flexion, abduction, and place posterior pressure to lift the greater trochanter









Flowchart published in Clinician Reviews, April 2016

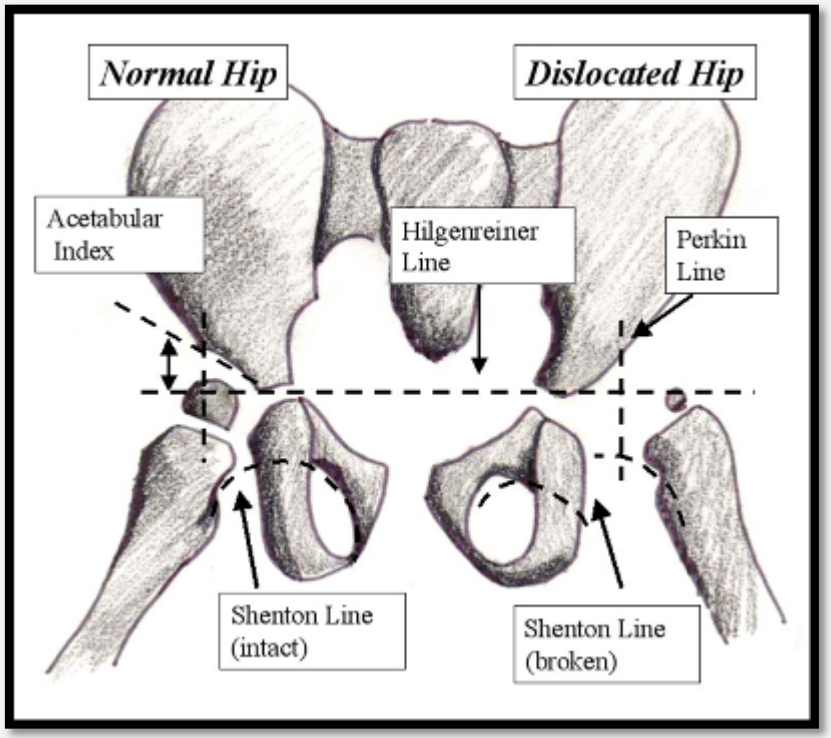
DDH: IMAGING

Ultrasound is diagnostic test of choice for infants

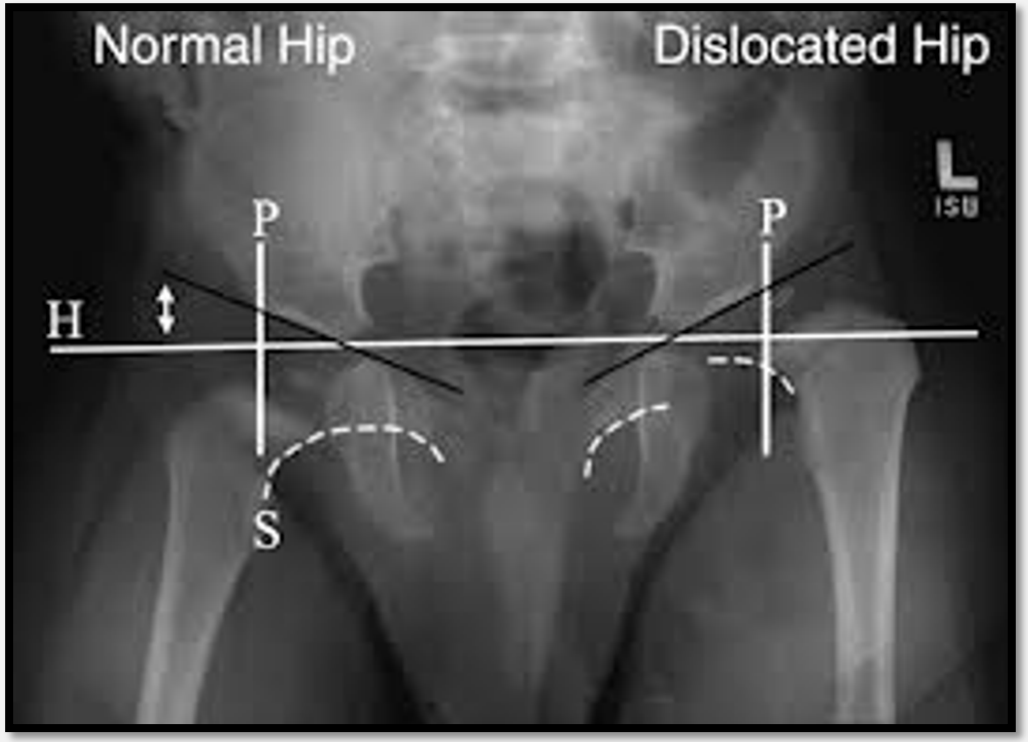
- Requires dynamic stress testing by skilled provider
- Recommended **after 3-4 weeks**
- Utilized to confirm suspected diagnosis or with significant risk factors
- Universal ultrasound screening is not recommended

AAOS

DDH: RADIOGRAPHS



Diagnostic Imaging



Case courtesy of Dr Mohammad A. ElBeialy, Radiopaedia.org, rID: 23583

DDH: MANAGEMENT

Photo Courtesy of Trent Tipton, PA-C

- Refer to Pediatric Orthopaedic Specialist
- Clinical suspicion is adequate to initiate treatment
- Mainstay initial treatment is Pavlik harness
- Treatment should be implemented before 6 weeks of age
- Syndromic or neuromuscular disorders may have more advanced dysplasia that will not respond to harness.

Hip-Healthy Products

DDH: PARENT EDUCATION

Patient compliance is essential

- Frequent appointments with pediatric orthopaedics to assure harness fit and evaluate femoral nerve function

- No need to remove harness for well child checks and perform specialized tests once DDH is diagnosed

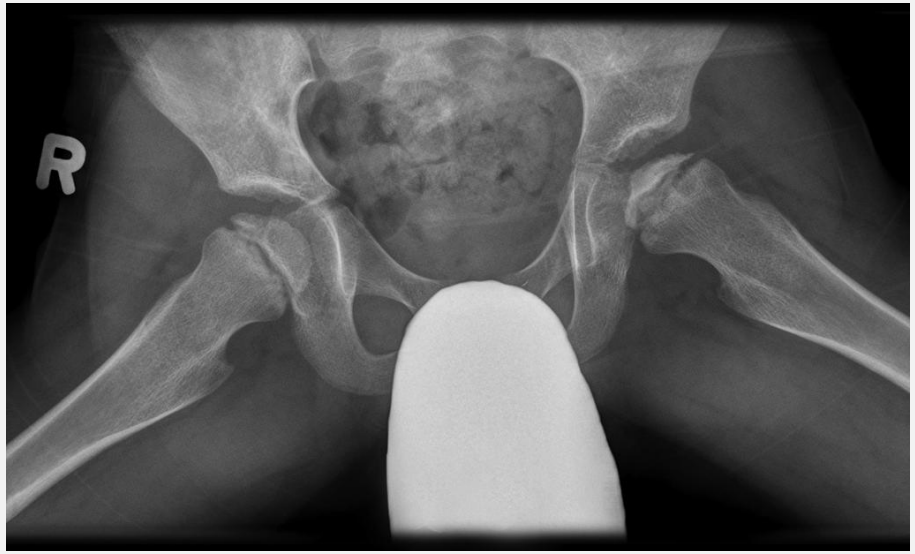
- Parents will be asked to avoid tight fitting clothes and provided recommendations for safe swaddling and hip healthy products

LEGG-CALVE-PERTHES DISEASE

LEGG-CALVE-PERTHES DISEASE

Juvenile idiopathic osteonecrosis of the femoral head

- Peak incidence 4-8 years of age, M>F 5:1
- Bilateral in 10-20%
- Risk Factors:
  - Family History
  - Maternal smoking/secondhand smoke
- Associated with hyperactivity (ADHD)



Case courtesy of A.Prof Frank Gaillard, Radiopaedia.org, rID: 7983

PERTHES: CLINICAL PRESENTATION

- Painless limp or insidious onset of pain: hip, groin, thigh, or knee
  - Limp or pain is often activity related and worsens by the end of the day
  - Pain relieved with rest
- Muscle spasticity may be present
- May have history of minor trauma

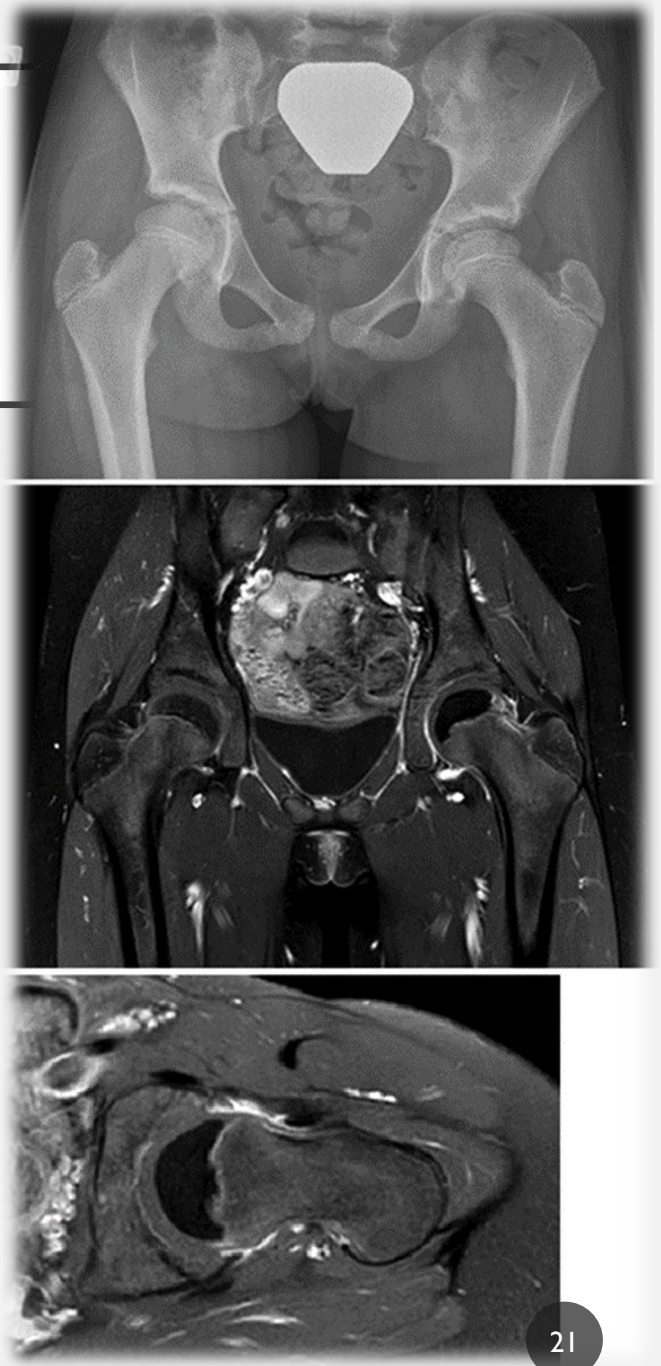
*Diagnosis often by high clinical suspicion

PERTHES: PHYSICAL EXAM

- Gait disturbance: Antalgic limp / Trendelenburg gait
- Limited internal rotation or abduction of hip
- Limb length discrepancy presents later in the course of the disease
  - (+) Galeazzi

PERTHES: IMAGING

- Radiographs (AP and frog laterals) are mainstay for diagnosis and monitoring condition
  - Plain radiographs are often initially normal
  - Bone scan or MRI if needed
- Fragmentation and remodeling present on radiographs with disease progression



Talal Ibrahim, and David G. Little JBJS Reviews 2016;4:e4

PERTHES: TREATMENT

- Age of onset best prognostic factor
  - Younger age at presentation = better outcome
- Goal: Symptomatic control and preserve hip function
- Treatment recommendations are controversial
  - Literature supports early surgical intervention, but overall improvement is modest, and number needed to treat is high
    - Nonsurgical Options: Observation, activity restrictions, PT

SLIPPED CAPITAL FEMORAL EPIPHYSIS (SCFE)

SCFE

Also referred to as slipped upper femoral epiphysis (SUFE)

- Slipping along the femoral physis
  - "Ice cream slipping off the cone"
- Peak incidence is 10-16 years old, M>F
- Bilateral in 20-40% of patients
- Obesity is significant risk factor

SCFE: CLINICAL PRESENTATION

- Typical presentation: obese adolescent with dull, achy hip pain and difficulty with ambulation
  - May be associated with history of minor trauma
  - Isolated knee or thigh pain in 15% of cases

SCFE: PHYSICAL EXAM

- Decreased hip ROM
  - Limited internal rotation, abduction, and flexion
  - Pain may be present
- Positive Trendelenburg may be seen in chronic presentation

Stability:

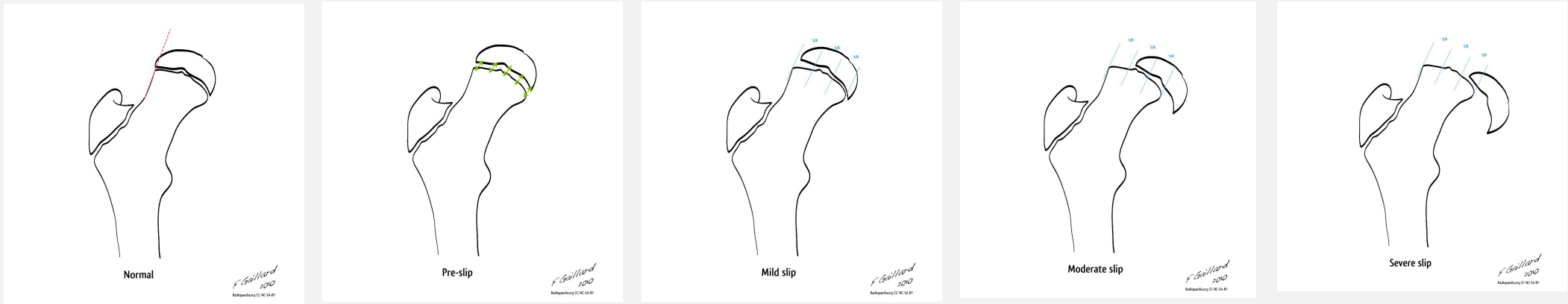
- Stable slip: patient able to walk or weight bear
- Unstable slip: unable to bear weight even with crutches due to pain and displacement, pain severe

SCFE: IMAGING

MRI is better to detect pre-slips

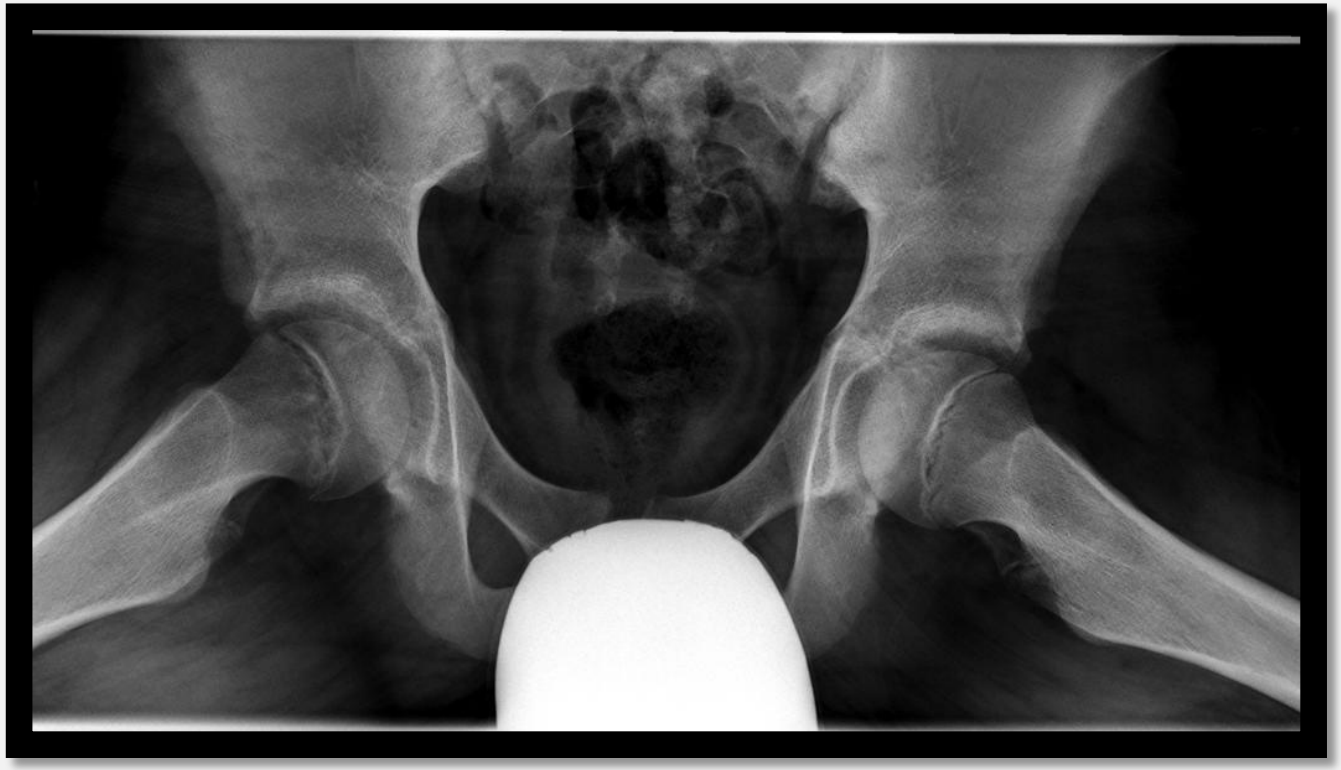
Radiographs are typically sufficient for diagnosis

- AP and lateral views of **both** hips
  - Line of Klein: line drawn along lateral edge of femoral neck on AP view should intersect the epiphysis



Case courtesy of A.Prof Frank Gaillard, Radiopaedia.org, rID: 8004

SCFE: IMAGING



Case courtesy of A.Prof Frank Gaillard, Radiopaedia.org, rID: 7984

Classification Patterns	Symptoms	Imaging
Pre-slip	Pain present	Physeal widening (-) Displacement
Acute	Sx < 3 weeks Severe pain Limited ROM	(+) Joint effusion (-) Metaphyseal remodeling
Acute-on-chronic	Sx ≥ 3 weeks Acute increase in pain Decreased ROM	(+) Joint effusion (+) Metaphyseal remodeling
Chronic	Sx ≥ 3 weeks Vague, intermittent pain	(-) Joint effusion (+) Metaphyseal remodeling

SCFE: TREATMENT

- **Non-weight bearing**
- Admit to hospital on bed rest
- Emergent operative stabilization
  - Goal: prevent further slippage and avoid potential complications

SEPTIC ARTHRITIS AND TRANSIENT SYNOVITIS OF THE HIP

SEPTIC HIP

- Hip joint is involved in 35% of septic arthritis cases
- Epidemiology:
  - Peak occurrence in first few months of life and again between ages 3-6 years old, M>F

Pathophysiology:

- Direct inoculation from trauma or surgery
- Hematogenous seeding
- Spreading of osteomyelitis from adjacent bone

SEPTIC HIP

Clinical Presentation:

- Febrile and acutely toxic appearing
- Monoarticular pain: severely exacerbated with passive ROM
- Limited or refusal to weight bear

Differential Diagnosis:

- Psoas abscess
- Transient synovitis

Inflammatory

DDX: TRANSIENT SYNOVITIS OF THE HIP

Most common cause of pediatric hip pain

- Appears well, typically afebrile
- Pain worse in am and improves during day
- Recent URI
- Etiology unclear, 3-8 years-old, M>F

Management: NSAIDs

- Improves in 24-48 hours with resolution within 1 week
- Must rule out septic arthritis, hospitalize if suspicious

SEPTIC HIP VS TRANSIENT SYNOVITIS

- Kocher Criteria
  1. WBC > 12,000
  2. ESR > 40
  3. Fever > 101.3
  4. Non-weight bearing on the affected side
  - 2/4 criteria warrants joint aspiration
- CRP independent risk factor
  - CRP >2.0

Probability based on # of Kocher Criteria Met:

- None: 0.2%
- 1/4: 3%
- 2/4: 40%
- 3/4: 93%
- 4/4: 99.6%

J. Bone Joint Surg. Am. 1999;81:1662-70

SEPTIC ARTHRITIS: DIAGNOSTICS

- **Prompt arthrocentesis: Gold standard**
  - Watery and cloudy
  - WBC > 50,000, >90% leukocytes
  - Gram stain only identifies organism 1/3 of the time and not definitive
  - Microbial culture and sensitivity testing (50-60% positive)
- Labs: WBC with diff, ESR, **CRP,** blood culture
- Other considerations:
  - Gonococcal arthritis: culture
  - Group A strep: throat culture, ASO titer
  - Serology for coccidioidomycosis

SEPTIC ARTHRITIS: DIAGNOSTICS

- Radiographs: AP/Lat may show increased joint space (effusion) or narrowing (destruction)
- Ultrasound: detect effusion and guide aspiration
- MRI : detects effusion, bone involvement, or associated concerns
  - Pediatric patients require sedation

Case courtesy of Dr Ahmed Abd Rabou, Radiopaedia.org, rID: 27744

Management is Emergent

SEPTIC HIP

Operative management: surgical I&D

- Joint aspiration or surgical identification is diagnostic

Antibiotic Need: Empiric treatment with modifications based on gram stain and culture

- ***S. aureus***, *S. pneumo*, group A strep, *H. influenza*
- Monitor CRP and ESR: duration typically 3-4 weeks

Non operative management consideration

- *N. gonorrhoeae* in adolescents: High dose penicillin

ATRAUMATIC HIP DIAGNOSTICS

- Infectious or Inflammatory Causes:
  - Basic Labs: CBC, ESR, CRP, blood culture
  - Rheumatologic: RF, ANA
  - Septic Arthritis: arthrocentesis urgently
    - Gram staining, cell count, and culture
- Imaging
  - Plain radiographs are first line
    - Consider AP pelvis and Frog Laterals of both hips
  - Ultrasound: effusion, infant hips
  - MRI: high suspicion or early presentation

Night Pain or Pain at Rest
- Red Flag
- Warrants further work-up

TAKE HOME POINTS

1. Consider imaging for breech newborns or with positive family history of hip dysplasia regardless of physical exam findings.
2. Always fully evaluate the hip with all atraumatic knee complaints.
3. Patients need to be made non-weightbearing immediately following suspicion for slipped capital femoral epiphysis.
4. Labs and NSAIDs can initially help differentiate infectious versus inflammatory process of the hip.
5. SCFE and Septic arthritis of the hip require emergent identification and orthopaedic consultation.

RESOURCES

- AAOS: http://www.aaos.org/
- POSNA: https://posna.org/
- AAFP: http://www.aafp.org/
- International Hip Dysplasia Institute: http://hipdysplasia.org/
- Radiopaedia: http://radiopaedia.org/
- Radiology Assistant: http://www.radiologyassistant.nl
- OrthoBullets: https://www.orthobullets.com

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