Focused History

• 9-year-old male with past medical history significant for obesity
• Presented to clinic with left hip pain over the past two months
  • Describes the pain as non-radiating, dull, and aching
  • No history of preceding trauma
• Furthermore, the patient recently began limping
• On exam, he was afebrile
• CBC, ESR, and CRP were unremarkable
Causes of Hip Pain in a Child

Infectious
- Septic arthritis
- Lyme disease
- Osteomyelitis
- Psoas abscess
- Pyomyositis
- Spinal epidural abscess
- Appendicitis
- Abdominal/pelvic abscess

Inflammatory
- Transient synovitis
- Spondyloarthritis
- Juvenile idiopathic arthritis
- Infectious/post-infectious arthritis
- Other rheumatologic conditions (e.g., SLE, MCTD, vasculitis, dermatomyositis, CRMO, localized scleroderma, FMF)
- Arthritis associated with gastrointestinal conditions (e.g., IBD, celiac disease)
- Idiopathic chondrolysis of the hip

Mechanical or Orthopedic
- Slipped capital femoral epiphysis
- Legg-Calvé-Perthes disease
- Secondary avascular necrosis
- Femoral stress fracture
- Muscular strain
- Iliac apophysitis
- Snapping iliopsoas tendon
- Trochanteric bursitis
- Acetabular labral tear
- Femoroacetabular impingement
- Apophyseal avulsion fracture with apophysitis

Neoplastic
- Osteoid osteoma
- Leukemia
- Solid tumor (primary or metastatic)
- Pigmented villonodular synovitis

Other
- Sickle cell disease
- Gaucher disease
- Neuromuscular disorders (e.g., muscular dystrophy)
Therefore, two views of the pelvis were obtained.
List of Imaging Studies

• AP Radiograph of Pelvis
• Lateral Radiograph of Left Hip
AP Radiograph of Pelvis

Normal Klein’s line (a line along the superior edge of the neck of the femur that intersects the lateral part of the superior femoral epiphysis).

Abnormal Klein’s line where the epiphysis is malaligned with no intersection of the capital femoral epiphysis.

Proximal femoral capital epiphysis
Widening and malalignment of the left capital femoral epiphysis consistent with a mild slipped capital femoral epiphysis.
Slipped Capital Femoral Epiphysis (SCFE) – Definition

- Also called slipped upper femoral epiphysis (SUFE)
- Type I Salter-Harris fracture through the proximal femoral physis
  - Fracture that is completely contained within the physis
- Loss of structural integrity along the physis results in displacement of the femoral neck and the appearance of a posteriorly and inferiorly displaced epiphysis

Case courtesy of Dr Matt Skalski, Radiopaedia.org, rID: 27144
Clinical Features

• Affects 1 to 6 in 20,000 patients with a 2:1 male predominance
• Bilateral in up to one third of patients
• Most common in patients 10 to 15 years of age
  • Due to the combination of increased biomechanical stress and a weakened perichondrial ring during puberty from increased growth and hormonal changes
• Risk factors include endocrinopathies (such as hypothyroidism, renal disease, and hypogonadism), biochemical stress (such as trauma and obesity), and African or Hispanic ancestry
• Acute SCFE is associated with an unstable joint and severe pain of less than 3 weeks’ duration whereas pain is mild and may subside with rest in a chronic SCFE
• In stable SCFE, the patient maintains the ability to bear weight, which is lost in unstable SCFE
Radiographic Findings

- Widening, lucency, and irregularity of the physis
- Sclerosis of the femoral neck
- Bone remodeling
- Displacement of the epiphysis from the metaphysis anteriorly or posteriorly on lateral view
- Osteonecrosis, chondrolysis, and osteoarthritis in the hip joint
- Klein’s line does not intersect with the epiphysis on frontal view
  - In the normal AP view, a line drawn along the superior femoral neck intersects the lateral portion of the femoral head

Correct interpretation of the radiographs is critical. In as many as 25 percent of patients whose SCFEs are missed, radiographs were misinterpreted, or the diagnosis could not be established with the radiographs that were obtained.
Severity Grading

- **Mild**: Displacement of epiphysis <1/3 of diameter of femoral neck in the AP view or <30 degrees of displacement on true lateral projection
- **Moderate**: Displacement of epiphysis >1/3 but <1/2 of diameter of femoral neck in AP view or 30 to 50 degrees on true lateral projection
- **Severe**: Displacement of epiphysis >1/2 of diameter of femoral neck on AP view or >50 degrees on true lateral projection

Severity based upon radiographic findings determines prognosis.

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Management

• SCFE should be treated as an emergency upon diagnosis and confirmation by imaging
  • Children with SCFE should be made non-weightbearing and promptly referred to an orthopedic surgeon

• Surgery is the treatment of choice to prevent further slippage and promote physeal closure
  • Screw fixation is the most commonly used and widely accepted treatment

• Prophylactic pinning of the opposite hip is considered an option by some surgeons but is controversial
Back to our case...

Right hip is normally aligned.

Interval pinning of left hip. Fully threaded screw transversing the left femoral neck.
Lateral Radiograph of Left Hip

No adverse hardware features of left hip.
Two years later...

Patient has since developed right-sided SCFE. Interval pinning of right hip.

Fully threaded screw transversing the right femoral neck.

AP Radiograph of Pelvis

Fragmentation and sclerosis of left proximal femoral epiphysis.

Interval removal of pin in left hip due to fixation failure.
Lateral Radiograph of Hips

No adverse features of right hip.

Stable alignment of left hip with elements of healing avascular necrosis.
Complications

- Avascular necrosis
  - The most serious complication and has the worst prognosis
  - May be a complication from an acute slip or surgical fixation
- Chondrolysis
  - Defined as narrowing of the joint space and loss of articular cartilage
- Femoroacetabular impingement
  - Abnormal contact between the proximal femoral metaphysis and the acetabular rim
- Osteoarthritis

Key Points

• Approximately 2:1 male predominance
• Type I Salter-Harris fracture through physis
• Displacement of the metaphysis while the epiphysis remains within the acetabulum
• Risk factors include obesity, trauma, and endocrinopathies
• Common complications include avascular necrosis, chondrolysis, and osteoarthritis
• Always obtain both AP and lateral views of the hips when suspicious for SCPE
References


