

# **Slipped Capital Femoral Epiphysis**

## **Background**

1. Displacement of capital femoral epiphysis (femoral head) from femoral neck through physeal plate
2. General Information
  - Common hip disorder in adolescents
  - 15% present with isolated thigh or knee pain
  - Bilateral in 20-50% of cases

## **Pathophysiology**

1. Pathology of disease
  - Proximal femur distal to physeal plate displaced anterolaterally and superiorly
  - Shear force applied to femoral head
    - Leads to loss of mechanical integrity of physeal plate
2. Incidence/prevalence
  - 1:1000 to 1:10,000 children and young adolescents
  - Mean age at presentation
    - Males: 13.5 years
    - Females: 12 years
    - Male: Female ratio 1.5:1
3. Risk factors
  - Obesity
    - $\geq 90$ th percentile of weight for age/sex
  - Male gender
  - Genetic predisposition
  - Trauma
  - Endocrine disorders
    - Hypothyroidism
    - Growth hormone deficiency
  - Connective tissue disorders
  - Renal failure
  - History of radiation therapy
  - Genetic disorders
    - Down syndrome
    - Rubenstein-Taybi syndrome
4. Morbidity / mortality
  - Most serious complication-osteonecrosis of femoral head
    - Leads to degeneration of femoral head
    - Often necessitates surgical intervention
    - Occurs in 10-25% of SCFE cases
  - Chondrolysis
    - Results in narrowing of joint space and destruction of articular cartilage
    - Occurs in 5-7% of SCFE cases
  - Premature osteoarthritis often occurs especially if unrecognized

## Diagnostics

### 1. History

- Adolescent with complaint of painful ache in groin, hip or knee
- Painful limp with or without trauma
- Pain after jumping
- Altered gait
- Pain increased with activity

### 2. Physical exam

- Lower extremity held in external rotation
- Decreased range of motion (ROM) of hip
- Internal rotation especially decreased
- May have shortening of involved leg
- Patient may present with antalgic gait
- Active ROM limited by muscle spasm
- Patient may have Trendelenburg gait
  - Downward pelvic tilt during stance phase of gait
    - Due to weakness of contralateral hip muscles
- Knee exam normal
  - May complain of knee pain
- Atrophy in thigh and gluteal muscles may be observed

### 3. Presentation patterns

- **Preslip**
  - Pain without displacement of epiphysis
- **Acute**
  - Symptoms <3 weeks
  - Joint effusion
  - Limitation of motion
  - Usually significant pain
  - Unable to bear weight
  - May be associated with trauma
  - Unstable
- **Chronic**
  - Vague and intermittent symptoms for >3 weeks
  - Stable
- **Acute on Chronic**
  - History of pain/limp for >3 weeks
  - Develops acute onset of pain and limitation of ROM

### 4. Severity

- Mild
  - Displacement of epiphysis <1/3 the diameter of femoral neck
- Moderate
  - Displacement of epiphysis is between 1/3 and 1/2 the diameter of femoral neck
- Severe
  - Displacement of epiphysis is >1/2 of the diameter of femoral neck

### 5. Diagnostic testing

- Laboratory evaluation - if suspect atypical causes

- TSH, T4 to evaluate for hypothyroidism
  - Growth hormone
  - Creatinine to evaluate for renal failure
6. Diagnostic imaging
- Hip radiographs (preferred modality)
    - Anteroposterior (AP) view
      - AP-posterior displacement of femoral epiphysis
        - Ice cream slipping off a cone
      - Blurring of metaphysis and physeal plate
      - Blanch Sign of Steel
        - Portion of femoral head behind metaphysis projects as a semicircular area of increased density
    - **Klein's Line**
      - Line drawn along superior portion of femoral neck should intersect epiphysis by at least 20%
      - <20% suggests SCFE
    - Lateral (cross table or frog-leg)
      - Posterior displacement and step off of epiphysis
      - If acute slip do cross table lateral
        - Frog leg may displace physis in unstable hips
  - CT scan
    - Can be used to standardize severity of chronic SCFE
    - Not been shown to be superior to plain radiographs
  - MRI
    - Useful to detect preslip
    - May show a widened physis or edema in area of physis
  - Bone scan
    - Decreased uptake early due to necrosis
    - Increased uptake later due to new bone formation

## Differential Diagnosis

### 1. Key DDX

- Legg-Calve Perthes disease
- Groin strain
- Trauma (hip or knee contusion/fracture)
- Synovitis
- Malignant or benign tumor
- Juvenile Rheumatoid Arthritis

### 2. Extensive DDX

- Hernia (Femoral or Sports)
- Septic Joint
- Chronic developmental dysplasia
- Osteitis Pubis

## Therapeutics

### 1. Acute treatment

- Prompt orthopedic evaluation
- Non-weightbearing with crutches or wheelchair

### 2. Further management

- Operative management
    - Internal fixation-recommended treatment
      - Most common-single cannulated transphyseal screw
      - Occasionally 2 screws needed to provide adequate fixation
      - May require manipulation
        - Increases risk for complications
    - Osteotomy may be required:
      - Delayed recognition
      - Severe deformity
    - Bone graft epiphyseodesis
      - More complications
        - Graft breaking
        - Further slippage
        - Increased blood loss
  - Spica cast immobilization
    - Not recommended
    - High rate of chondrolysis
    - Pressure sores common
3. Long-term care
- Limit weight bearing with crutches or walker
  - Discontinue crutches at 6-8 weeks
  - Gradual resumption of cardiovascular fitness, ROM, resistance exercises
  - Sports may be an option after physeal plate starts to fuse
  - Implant removal is controversial after physeal plate fuses

### **Follow-Up**

1. 30-60 % of unilateral SCFE involvement at presentation will develop contralateral involvement
2. 80% of sequential slips occur at around 18 months
3. Repeat examinations of contralateral hip during first 1-2 years of diagnosis
4. Continue close follow up until growth has stopped

### **Prognosis**

1. Usually good if mild and Tx early
2. Risk of osteoarthritis increases with greater severity of slip
3. Unrecognized SCFE associated with high risk of premature osteoarthritis

### **Prevention**

1. Maintenance of normal weight for age and sex

### **Patient Education**

1. Handout from AAFP: <http://www.aafp.org/afp/980501ap/980501a.html>

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