Pediatric Hip Disorders: Slipped Capital Femoral Epiphysis (SCFE) and Legg-Calvé-Perthes Disease (LCPD)

Alexa J. Karkenny, MD, Brandon M. Tauberg, MD, Norman Y. Otsuka, MD

Montefiore Medical Center and the Children’s Hospital at Montefiore, Bronx, NY
Objectives

1. Identify general anatomy relevant to SCFE and LCPD pathology.
2. Recognize symptoms and physical examination findings of SCFE and LCPD.
3. Know the basic laboratory values and imaging to order to evaluate for SCFE and LCPD when referring to a specialist.
4. Differentiate straightforward presentations of SCFE and LCPD.
5. Understand broad treatment categories and prognoses of SCFE and LCPD.
6. Realize the importance of timely referral to a specialist for SCFE and LCPD.
SCFE: Background

• Most common hip pathology affecting adolescents
• Up to 20% of diagnoses are delayed
• Caused by weakness in physis (growth plate), allowing femoral neck to move anterior to (in front of) the femoral head
• Can have major short- and long-term consequences
SCFE: Epidemiology

- Average age at onset is 12.7 years old (13.5 years in boys, 12.0 years in girls)
- Usually presents during puberty
- 1.5x more common in males than females
- Risk factors: obesity, metabolic abnormalities (such as hypothyroidism), kidney disease
SCFE: Presentation

- Typical patient is 10-14 years old, obese, with a chief complaint of hip/groin pain
- May be acute or chronic, +/- related to specific low-energy trauma
- May be uni- or bilateral, though unilateral is more common
- Limited hip range of motion
  - May have obligatory external rotation with passive hip flexion
- Stable = can bear weight on extremity
- Unstable = unable to bear weight on extremity
- Average time from onset to presentation is typically 8 weeks
The patient’s left hip remains in neutral rotation as the hip is flexed to 90 degrees.

The patient’s right hip demonstrates ‘obligatory external rotation’, as the hip rotates externally as the hip is flexed to 90 degrees.
SCFE: Evaluation

• Detailed history (including family history and medication list) and physical exam
  • Pay attention to metabolic disorders

• Radiographs of the pelvis and hips: anterior-posterior (AP) pelvis with bilateral frog-leg laterals (hips flexed and abducted)
  • A single hip radiograph is not adequate (cannot compare to contralateral hip)

• MRI not typically needed unless negative x-rays and high suspicion

• Labs, including BMP and TSH, should be obtained in patients <10 years old, weight <50th percentile, or suspected endocrine abnormalities
Evaluation of a 13-year-old female with a left sided SCFE. Klein’s lines (along the superior aspect of the femoral neck) are drawn on both sides, illustrating its intersection with the femoral head on the right hip, while falling lateral to it on the left side affected by SCFE.
SCFE: Treatment and Prognosis

• Refer early to pediatric orthopedics when there is suspicion for SCFE
• The goal of treatment is to prevent worsening slippage, thus helping prevent other downstream effects such as osteoarthritis and avascular necrosis
• Treatment is typically operative with different surgical methods used to stabilize the femoral head
Key Features of Slipped Capital Femoral Epiphysis that the Pediatrician Can Recognize

- Age of presentation typically 10-14 years old (puberty)
- More common in obese patients, males > females (1.5x)
- Family history of SCFE
- Usually unilateral pain, though may be bilateral
- Typically groin/hip pain, though 15-23% may present with knee pain
- Walk with limp
- Can the patient bear weight?
- Obligatory external rotation with flexion
LCPD: Background

• Idiopathic osteonecrosis of the *capital femoral* (femoral head or ball) *epiphysis* occurring in otherwise healthy children

• Growth arrest followed by bone resorption, femoral head weakening and flattening, re-ossification, and growth resumption

• The cause of the initial vascular insult is unknown and the subject of debate
LCPD: Epidemiology

- Patients classically present between 4 and 8 years of age, but can present from 18 months of age to skeletal maturity
- Male-to-female ratio: 3:1 up to 5:1
- Bilateral disease occurs in 10-15% of patients
LCPD: Presentation

• Painless limp for a few weeks to months (or may have variable hip pain, or pain referred to knee, thigh, or buttock) +/- antecedent trauma
• Limited hip abduction and internal rotation (best tested with the hip extended) are the most consistent signs
• Apparent shortening of the affected extremity in unilateral cases
• Weak quadriceps and hip abductors, with muscle atrophy
LCPD: Evaluation

- Detailed history (including family history and medication list) and physical exam
- Radiographs of the pelvis and hips: anterior-posterior (AP) pelvis with bilateral frog-leg laterals (hips flexed and abducted)
- A single hip radiograph is not adequate (cannot compare to contralateral hip)
- MRI is more accurate in the early diagnosis and provides better detail on the extent of necrosis and deformity
Early radiographic signs include flattening of the femoral head (ball) and subchondral sclerosis (left hip).

Later signs include extrusion of the femoral head (ball) laterally, such that it is not contained, or covered, by the acetabulum (socket) (right hip).
LCPD: Differential Diagnosis

• LCPD is a diagnosis of exclusion
• Other diseases causing osteonecrosis of the femoral head must first be ruled out (sickle cell disease, chronic systemic disease such as lupus, chemotherapy, and chronic steroid use)
• Radiographic mimickers include multiple epiphyseal and Gaucher’s disease, which typically affect bilateral hips
LCPD: Treatment and Prognosis

• Refer early to pediatric orthopaedics when there is suspicion for LCPD
• Currently there is no cure for LCPD
• The goals of treatment are to maintain a round femoral head and reduced hip, prevent/delay eventual arthritis, and preserve motion
• Nonoperative treatment for early disease: NSAIDs, protected weight bearing, limited physical activity, physical therapy for range of motion
• Surgery for those who do not respond to nonoperative treatment: contain the ball within or deeper within the socket
Key Features of Legg-Calvé-Perthes that the Pediatrician Can Recognize

- Onset most commonly between 4 and 8 years of age
- Male prevalence (4-5x more likely than females)
- Bilateral involvement in 10-15% of patients
- Symptoms: pain in the groin, greater trochanter, proximal thigh, or knee; limp exacerbated by activity; possible history of prior trauma
- Signs: Trendelenburg gait, decreased hip range of motion (especially with abduction and internal rotation)

Adapted from Herring JA, ed. Tachdjian’s Pediatric Orthopaedics: from the Texas Scottish Rite Hospital for Children. 5th ed. Philadelphia, PA: Elsevier Saunders; 2014:580–629
# How Do I Distinguish SCFE and LCPD?

<table>
<thead>
<tr>
<th>Feature</th>
<th>SCFE</th>
<th>LCPD</th>
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<tbody>
<tr>
<td>Age</td>
<td>Usually 10-14 yrs</td>
<td>Usually 4-8 yrs (but anywhere from 18 mo to skeletal maturity)</td>
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<tr>
<td>Onset</td>
<td>Variable – acute (&lt;3 weeks) versus chronic (&gt;3 weeks)</td>
<td>Variable – weeks to months</td>
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<tr>
<td>Prior trauma</td>
<td>Sometimes</td>
<td></td>
</tr>
<tr>
<td>Associated diseases</td>
<td>Obesity, endocrinopathy</td>
<td>Coagulopathy, hyperactivity, genetic mutations in type II collagen</td>
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<tr>
<td>Gait</td>
<td>Variable – may be weight bearing (stable) or not able to tolerate weight bearing (unstable)</td>
<td>Usually limping</td>
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<tr>
<td>Pain</td>
<td>Variable – don’t forget that it can be in the groin, lateral hip, thigh, or referred to the knee</td>
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<tr>
<td>Range of motion</td>
<td>Restricted – classically, “obligatory” external rotation when the hip is flexed</td>
<td>Restricted – classically, loss of internal rotation and abduction</td>
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<tr>
<td>Unilateral or bilateral</td>
<td>18-63% bilateral</td>
<td>10-15% bilateral</td>
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Summary and Tips for Practice

• Look for classic history and physical exam findings to make an early diagnosis.

• Refer patients with *abnormal* physical exam or imaging findings, or persistent hip, knee, or groin pain despite *normal* imaging findings to a pediatric orthopedist.

• Based on strong research evidence, there are adult consequences of SCFE and LCPD.

• Treatment of SCFE and LCPD remains under debate.