

# Radiology Review of Neuromusculoskeletal Conditions Lower Extremity

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University of Bridgeport  
Health Sciences Postgraduate Education

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## Case 1 – 20F, left hip pain

A 20-year-old female presents complaining of left hip pain of 2 weeks duration. She recently started exercising and experiencing pain that has steadily increased in intensity and frequency, mostly during and after workouts (especially running).

Orthopedic examination of the left hip revealed pain with FABER position. Fitzgerald test revealed pain while testing both the anterior and posterior portions of the labrum.

Hip radiographs and a hip MRI arthrogram were ordered.

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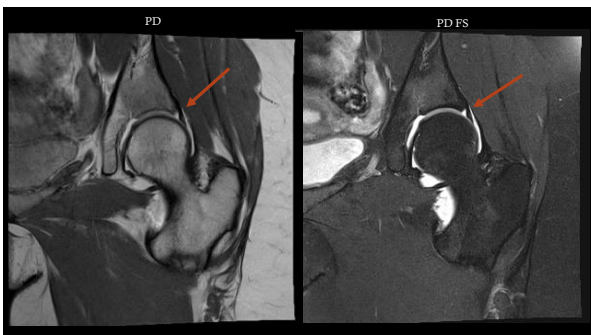
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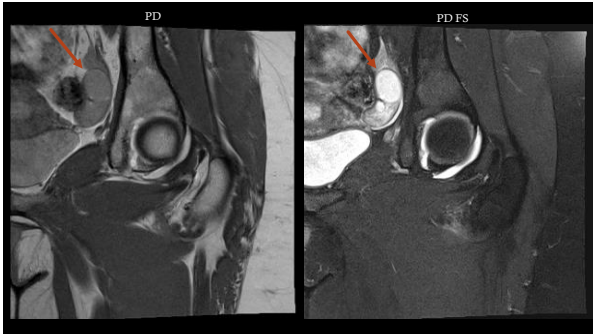
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Case 2 – 29M, bilateral hip pain

A 29-year-old male chiropractic student presents complaining bilateral hip pain (R>L) that is insidious and chronic in nature. He was a wrestler in high school and college and injured his hips multiple times.

Orthopedic examination of the hips revealed pain with FABER position. Fitzgerald test revealed pain while testing the anterior portions of the labrum. The right hip was more painful than the left.

Bilateral hip MRI arthrograms were ordered.

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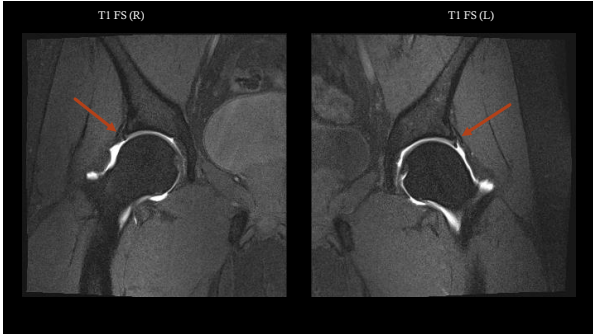
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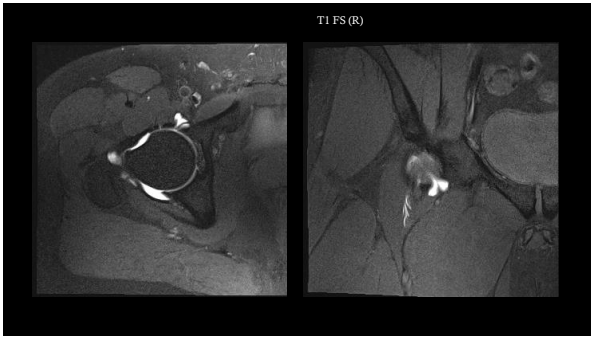
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Case 2 – 29M, bilateral hip pain

After undergoing conservative management with fair results, the patient had a reoccurrence of their right hip pain.

The patient's orthopedist ordered a hip CT.

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### Labral tear

- ◊ Acetabular hip tears are common causes of hip pain
- ◊ Skendel and Philippon report that 22-55% of painful hips
  - ◊ In the same paper, they report that 69% were found in asymptomatic individuals in another study
- ◊ The labrum functions to deepen the femoroacetabular (FA) joint and distribute forces
- ◊ Etiology considerations
  - ◊ Trauma – a common mechanism of injury is pivoting on weight-bearing femur
  - ◊ FA impingement (FAI) is increasingly recognized as an important risk factor of labral tears
  - ◊ Degeneration of the FA joint often also involves the labrum
  - ◊ Hip Dysplasia may result in an abnormal labrum with resultant damage/tear over time

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### Labral tear – Radiographic findings

- ◊ MRI
  - ◊ Non-arthrogram MRI is poor at evaluating labral tears (sensitivity, 8-25%)
    - ◊ Small field of view improves evaluation
  - ◊ Arthrogram MRI is a much better evaluator (sensitivity, 92%)
    - ◊ Abnormal morphology and elevated signal, damage to the articular cartilage (acetabular > femoral)
    - ◊ Paralabral cysts
    - ◊ Mimics – paralabral sulcus, undercutting of the articular cartilage
  - ◊ MRI may reveal tears and cartilage defects in asymptomatic individuals
- ◊ Radiographs and CT are poor evaluators

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## Labral tear

- ◊ Treatment
  - ◊ Physical therapy
    - ◊ Commonly includes pain control, core stabilization, ROM exercises, proper biomechanical movement patterns, and posture education
  - ◊ Intra-articular injection
    - ◊ Corticosteroids
  - ◊ Surgical repair (arthroscopy or open incision)
    - ◊ Debridement
    - ◊ Reconstruction, reattachment
    - ◊ May include osteochondroplasty (especially in the setting of FAI) or trimming of the acetabular ridge

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## Case 3 – 17M, fall down stairs

A 17-year-old male presents with knee pain post falling down the stairs (>8 steps) this morning. He states that he couldn't put any weight on it since.

It is visibly swollen and all knee orthopedic tests resulted in pain.

A knee MRI was ordered.

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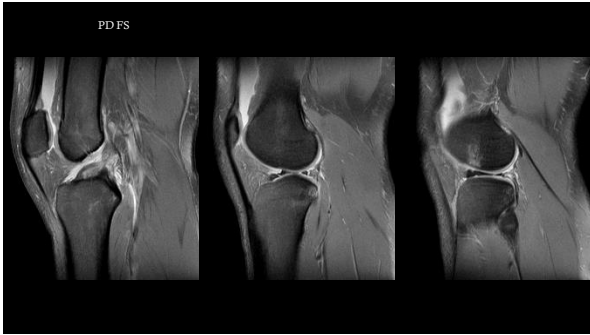
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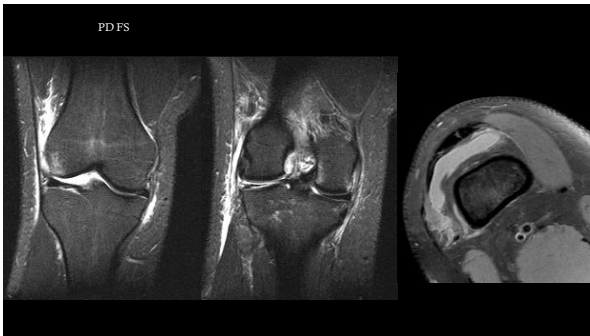
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### Severe internal derangement

- ◊ Very common injury to present to primary care, ED, chiropractor
- ◊ Etiology
  - ◊ Pivot-shift mechanism, dislocation, direct blow
- ◊ Clinical
  - ◊ Often presents with pain with or without audible pop
  - ◊ Draw tests, McMurray test, Apley test, varus/valgus stress, patellar apprehension, etc.
  - ◊ Ottawa and Pittsburgh knee rules
- ◊ Often involves the ACL and a meniscus
  - ◊ O'Donohue's triad – ACL, MCL, medial meniscus tear
- ◊ Delayed or missed diagnoses may result in accelerated degenerative changes and/or instability

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## Severe internal derangement – Radiographic findings

- ◆ Radiographs – may visualize fractures or knee joint effusion, poor at demonstrating internal derangement
  - ◆ Cecava et al. found that in patients with a knee joint effusion on radiographs >10mm (AP dimension), a 93% of MRIs demonstrated internal derangement
- ◆ MR
  - ◆ Good at visualizing ligaments, meniscal, and bony pathology
  - ◆ Arthrography improves diagnostic accuracy
  - ◆ Multiple sequences should be used to assess all structures
    - ◆ Fat suppressed images can give a false positive of meniscal tears
- ◆ US
  - ◆ Wang et al found that detection of knee effusion has a PPV of 90.9% and a NPV of 37.5%

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## Severe internal derangement

- ◆ Treatment
  - ◆ Conservative management is effective with low grade sprains
  - ◆ Surgical management is needed with complete tears of stabilizing ligaments and meniscal injuries involving the avascular portion
    - ◆ Graft for ACL/PCL – hamstring, patellar, or plantaris tendons are common
    - ◆ Reattachment of ACL/PCL/MCL/LCL
    - ◆ Debridement/resection of meniscus tear/injury
  - ◆ Post-op rehabilitation
    - ◆ Knee is commonly maintained in full extension for 3-5wks
    - ◆ After, progressive ROM exercises and weightbearing
    - ◆ Bracing is maintained until 8-10wk post-op
    - ◆ Return to sport or strenuous activity is held off until 9-12mo post-op

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### Case 4 – 23F, LBP

A 23-year-old female chiropractic student presents with low back pain. She has a history of Legg-Calvé-Perthes disease.

Palpation of the low back revealed trigger points in the paraspinal musculature and restrictions of the lumbar spine.

She brought her imaging for review.

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## Legg-Calvé-Perthes Disease

- ◊ Osteonecrosis of the femoral epiphysis in a skeletally immature individual
  - ◊ Hypothesized etiology is by vascular insult and repetitive mechanical stress
- ◊ Often seen in 4-8y, M 5:1 F
- ◊ Clinical
  - ◊ Presentation ranges from painless limp to hip or knee pain
  - ◊ May have decreased ROM or a Trendelenburg gait
  - ◊ May have bilateral involvement
- ◊ Stages (Waldenström, modified by Joseph et al.)
  - ◊ Initial (early and late), fragmentation (early and late), reossification (early and late), healed

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## Legg-Calvé-Perthes Disease – Radiographic findings

- ◊ Radiographs
  - ◊ Hip joint effusion – Waldenström sign
  - ◊ Sclerosis, flattening, and fragmentation of the femoral head
    - ◊ Crescent sign
  - ◊ Widening of the physis
  - ◊ Healed – coxa magna deformity
    - ◊ Early degenerative changes
- ◊ MRI
  - ◊ Bone marrow edema, percent of epiphyseal involvement, physis involvement, cartilaginous damage, labral involvement

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## Legg-Calvé-Perthes Disease

- ◊ Prognosis
  - ◊ Self-limiting with spontaneous revascularization
  - ◊ May have accelerated degenerative changes from femoral deformity
  - ◊ Herring lateral pillar classification (regarding femoral head)
    - ◊ <50% of lateral pillar involvement have better outcomes when management is surgical
    - ◊ >50% involvement has poor outcomes regardless of treatment
- ◊ Treatment
  - ◊ Aimed at minimizing deformity of femoral head
  - ◊ Early onset – observation with non-weightbearing status, long axis traction and anti-inflammatory medications
    - ◊ Manipulation, physiotherapy, acupuncture, bracing (part-time)
  - ◊ Surgical management
    - ◊ Core decompression, techniques that maintain proper hip joint mechanics

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### Case 5 – 49M, foot pain

A 49-year-old male presents to the chiropractic clinic with chronic midfoot pain. It stems from stepping awkwardly off of a curb a couple months ago. He has been getting some relief from treatment but not quick enough for the clinician.

The clinician ordered radiographs.

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### Incidental enchondroma

- ◊ Benign, intramedullary, hyaline cartilaginous tumor
- ◊ Slow growing, often asymptomatic
- ◊ Most common benign tumor of the hands and feet
- ◊ Thought to arise from physal remnants trapped within the medullary bone
- ◊ Pathologic fracture is a common presentation (40-60%) often as a result of trivial forces
- ◊ Rare malignant degeneration (<1%)

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### Incidental enchondroma – Radiographic findings

- ◊ Radiographs
- ◊ Hands/Feet
  - ◊ Expansile, lytic lesion often with cortical thinning
  - ◊ ± stippled calcification
- ◊ Long bones
  - ◊ Calcified matrix superimposed on a lytic matrix (ICE lesion)
- ◊ Versus low-grade chondrosarcoma
  - ◊ Stable lesion (over time) favors enchondroma
  - ◊ >2/3 endosteal scalloping – chondrosarcoma
  - ◊ New onset pain and older individual - chondrosarcoma

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## Incidental enchondroma

- ◆ Treatment
  - ◆ If asymptomatic and non-fractured, observation
    - ◆ With lesions involving >50% of the diameter of the bone involved
      - ◆ Surgical curettage with or without bone grafting may be indicated
  - ◆ Fractured lesions
    - ◆ Surgical curettage with or without bone grafting
- ◆ Prognosis for treated lesions is good

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