Scope of Practice

- Comprehensive Adult Hip Specialist
  - Hip Replacements
    - Minimally Invasive Anterior Hip Replacements
    - Complex Revision Hip Replacements
  - Hip Preservation Surgery
    - Hip Arthroscopy for Treatment of Labral Tears (*Articular Cartilage*) of the Hip
    - Open Hip Surgery to Correct Complex Deformities of the Hip
    - Open and Arthroscopic Surgery for Repair of Tendon Injuries about the Hip
  - Fracture Specialist
    - Fractures of the Hip and Proximal Femur
Etiologies of Acute Hip Pathology

- Fractures
- Avascular Necrosis
- Labral Tears (Cartilage)
- Aggravation of Pre-Existing Arthritis
- Muscular or Tendon Tears
- Referred Pain from LS Spine, Knee, Abdomen
Layered Approach to Evaluating the Hip

1. Bone
Layered Approach to Evaluating the Hip

1. Fractures

- Femoral Head
- Femoral Neck
- Intertrochanteric
- Subtrochanteric
Fractures

- Key Factors Determining Treatment:
  - Location
  - Patient’s Age
    - For Treatment of Femoral Neck Fractures
  - Fracture Pattern
    - Technical options of fixation
- Often Urgent Surgical Treatment (fixation within 24-36 hrs)
- Rare Non-Surgical Treatment
Blood Supply to the Hip

- Blood supply to the hip dictates treatment
Femoral Head Fractures

- Rare fractures occurring in combination with native hip dislocations
- High energy traumatic events (car/motorcycle accidents, falls from height)
- Typically younger individuals
- Goal to fix fracture
- **High rates of post-traumatic femoral head avascular necrosis – up to 40%**
  - Traumatic interruption to the femoral head blood supply and bone dies within 3 months - 4 years after initial fixation requiring hip arthroplasty (replacement)
Femoral Neck Fractures

- Treatment dictated by fracture pattern & patient’s age
- Non-displaced fractures
  - Can be missed on plain x-rays – require advance imaging (MRI most sensitive)
  - Stable fractures – fixed
  - High rate of healing, low rates of AVN (avascular necrosis) - 5%

![Images of femoral neck fractures]
Femoral Neck Fractures

- **Treatment dictated by fracture pattern & patient’s age**

- **Displaced fractures**
  - High rate of post-traumatic avascular necrosis (AVN) (as high as 40%)
  - Patient’s age is important in treatment
  - Older Individuals – hip replacement (*partial/hemiarthroplasty or total hip arthroplasty*)
  - Younger Individuals – attempt fixation
    - Risks of post-traumatic AVN requiring conversion hip replacement
Intertrochanteric & Subtrochanteric Fractures

- Fractures encased in muscular attachments with rich blood supply – fixed
  - High rates of union
  - Rare failure of fixation in poor bone quality

Intertrochanteric

Subtrochanteric
Intertochanteric & Subtrochanteric Fractures

- Fractures encased in muscular attachments with rich blood supply – fixed
  - High rates of union
  - Rare failure of fixation in poor bone quality
- 2 methods of fixation dependent on fracture location and pattern
  - Dynamic Hip Screw (DHS)
  - Cephalomedullary Nail
Post-Operative Course

- Significant severe injuries
  - Majority of patients can be weight bearing as tolerated post-operatively
  - Need extensive therapy
  - Possible need for subsequent surgery if development of post-traumatic avascular necrosis – conversion hip replacement
  - Maximal medical improvement typically 1 year post-op (*depending on post-operative course and complications*)
Layered Approach to Evaluating the Hip

2. Intra-articular layer
   - Labrum
   - Joint Capsule
   - Ligamentous Complex
   - Ligamentum Teres
Acetabular Labrum
Acetabular Labral Tears
Acetabular Labral Tears

- Traumatic
- Associated with underlying bony deformity:
  - *Femoral Acetabular Impingement Syndrome*
Femoroacetabular Impingement

- Involves abnormal contact forces between femoral head-neck and acetabular rim causing osseous-labral damage.
- **Morphological condition that predisposes hip to intra-articular pathology that becomes painful**
- Thought to be a prominent cause of osteoarthritis of the hip
Femoroacetabular Impingement

Cam Impingement
- Non-spherical femoral is jammed into the acetabulum causing chondrolabral separation
Femoral Acetabular Impingement (FAI)
Femoral Acetabular Impingement (FAI)
Femoroacetabular Impingement

**Pincer Impingement**
- Abnormal contact of acetabular rim and femoral neck as a result of over-coverage of the femoral head (*excessively deep hip socket*)—causing labral damage
- With persistent forceful levering of the head against anterosuperior labrum can develop contrecoup chondral injury in posteroinferior acetabulum.
Incidence of labral pathology is very high even in asymptomatic individuals as demonstrated in MRI studies:

- **Briggs, et al. British Journal of Sports Medicine, 2016.**
  - 101 asymptomatic individuals no history of hip surgery or injuries (ages 11-19)
    - 89% incidence of labral pathology in athletic individuals > 16 years
    - 56% incidence of labral pathology in athletic individuals < 16 years

  - 45 asymptomatic individuals, avg age 37.8 yrs
    - 69% of hips

- **Lee et al. Bone & Joint Journal, 2015.**
  - 70 asymptomatic adults avg age 26 years
    - 38.6% incidence of labral tears
Diagnosis of Acetabular Labral Tears

- History
  - Level of Pain
    - Sitting
    - Standing
    - Stairs
  - Location of Pain
  - Aggravating Factors
    - Rotational movements of hip
      - Getting in/out of car
      - Putting on shoes
      - Stairs – *need to hold onto handrail*
Key Exam Findings in Patient’s with Acetabular Labral Tear

- Provocative Maneuver
  - Anterior Impingement Testing
Imaging
Imaging – MR Arthrogram

Antero-superior labral tear
MRI arthrogram – sensitivity 76-91%, specificity 71% for detection of labral tears

- Versus <30% sensitivity for non-contrast 1.5T MRI scans
Diagnostic-Therapeutic Hip Injection

- Solidifies diagnosis and location of pain – aka “money-shot”

- 4 ml of 0.5% Bupivocaine (intermediate duration local anesthestic - onset 5-10 mins, lasts 4-8 hours)

- 80mg (1 ml) of Depomedrol (Long-acting cortisone)
Labral Tears and FAI Treatment Options

1. **Nonsurgical Treatment**
   
   I. Activity modification
   
   II. NSAIDs
   
   III. PT focusing on gluteal, tensor fascia latae, and core muscle strengthening
   
   IV. Intra-articular corticosteroid injections


- 37 pts with FAI treated with activity modification and PT.
- At 2 year f/u, 11% of pts crossed over to surgical intervention, and an additional 16% had recurrent symptoms but didn’t pursue surgery.
- The 89% of pts who pursued non-surgical treatment had improvement in their Harris hip score from 72 to 91 at 2 year f/u.
2. Surgical Options
   
   II. Hip Arthroscopy
   
   III. Surgical Dislocation

- Depends on complexity of deformity and associated intra-articular pathology
  - Complex deformities of residual childhood hip diseases require open surgeries
Hip Preservation Surgery for Femoral Acetabular Impingement (FAI)
Hip Preservation Surgery for Femoral Acetabular Impingement (FAI)
Hip Preservation Surgery for Femoral Acetabular Impingement (FAI)
Surgical Dislocation of the Hip for Complex Intra-articular Deformities
Surgical Dislocation of the Hip for Complex Intra-articular Deformities
Surgical Dislocation of the Hip for Complex Intra-articular Deformities
Hip Arthroscopy versus Surgical Dislocation

**Hip Arthroscopy**
- Advantages
  - Theoretically less invasive procedure
  - No risk of hardware irritation
  - No risk of injury to MFCA
  - Faster recovery

**Excellent to good outcomes after arthroscopy for FAI 56-100%.
- Byrd & Jones, AJSM, 2011.
Failures of FAI Surgery

1. Pre-existing degenerative changes/early arthritis
   - Tonnis Grade ≥2 (*Any joint space narrowing*)

2. Dysplasia

3. Insufficient osteochondroplasty


Hip Dysplasia

L-CEA 28°

L-CEA 8°
Periacetabular Osteotomy
Periacetabular Osteotomy
Right PAO
1 Year After PAO

L-CEA 13°

L-CEA 28°
Return To Sport Following PAO


- 71% patients, 39 hips in 36 active patients (*UCLA preoperative activity score ≥ 7*), able to return to pre-surgical or higher activity level after PAO at 33 month mean (18-59 months) follow-up
  - Overall no significant change in UCLA score (preop □ postop)
- 97% satisfaction postoperatively
- 4 patients (11%) still had activity limiting hip pain
- Sport participation varied from recreational to collegiate-level athletes
Hip Arthritis

Normal Joint Space 6-7 mm
Hip Arthritis
Treatment Options for Hip Arthritis

- Nonsurgical Treatment
  - Activity modification
  - NSAIDs
  - Physical Therapy
  - Intra-articular corticosteroid injections

- Surgical
  - Hip Arthroplasty (Hip Replacement)
Total Hip Arthroplasty
Total Hip Arthroplasty
Total Hip Arthroplasty
Total Hip Arthroplasty
Total Hip Arthroplasty

BONE

Implant Surface
Minimally Invasive Total Hip Arthroplasty

Surgical Approach

Direct Anterior Approach
Minimally Invasive Total Hip Arthroplasty

**Surgical Approach**

**Direct Anterior Approach**

- Standard Oblique Incision
- Bikini Incision

8-10 cm
Minimally Invasive Total Hip Arthroplasty

Surgical Approach

Posterior Approach

Tensor fasciae latae

Gluteus medius

Iliotibial band

Gluteus maximus

Joint capsule

Piriformis

Conjoined tendons of obturator internus and gemelli muscles
## Direct Anterior Approach

- Better functional outcome scores in early post-operative period
- Better early pain scores
- Earlier independent ambulation
- **Results level at between 6 weeks – 6 months**


## Mini Posterior Approach

- No difference in mean length of stay with performed with rapid recovery protocol


51 year old female presented for 2nd opinion of progressively increasing left hip pain.

Persistent symptoms despite PT, intra-articular cortisone injection, oral NSAIDs
Left Anterior Total Hip Arthroplasty
THA Longevity

- 30 year survival of THA: 73%
- Technology has dramatically changed...

THA Longevity

- Press-fit acetabular and femoral components

- Polyethylene manufacturing process has been entirely changed
THA Longevity
THA Longevity

- Modern THA in active patients younger than 50 years
  - 100% survivorship @10-14 years
Hip Resurfacing

Chicago Marathon.com

Orbea.com
Hip Resurfacing
Hip Resurfacing
Hip Resurfacing

- 96-100% Survival at 10-14 years

- Higher percentage of patients are able to return to running after hip resurfacing than traditional THA (94% vs. 74%)

  - Matharu et al. The outcome of the Birmingham Hip Resurfacing in patients aged <50 years up to 14 years postop. JBJS, 2013.
  - Glyn-Jones et al. Risk factors for inflammatory pseudotumour formation following hip resurfacing. JBJS-Br, 2009
Hip Avascular Necrosis

- Avascular Necrosis of Femoral Head – *interruption of the blood supply to the subchondral surface of the femoral head*
  - Risk factors:
    - Chronic steroid use
    - Excessive alcohol use
    - Caisson’s disease – *diving history*
    - **Idiopathic**
Hip Avascular Necrosis

- Treatment depends on integrity of the articular surface of the femoral head
Hip Avascular Necrosis

Pre-Collapse
- Off-label use of osteoporotic medications
- Femoral head core-decompression with autologous bone-marrow aspiration

Collapse of Articular Surface
- Hip Replacement

[Image of bone core-decompression and hip replacement]
3. Muscular Layer – comprises all the muscles around the hemipelvis, including lumbosacral and pelvic floor musculature that provides dynamic stability and muscular balance to the hip, pelvis, and trunk.
Hernias

- Inguinal Hernias
- Sports Hernias
  - External/Internal Oblique insertion onto conjoint tendon

Iliopsoas Tendonitis

- Tenderness over anterior aspect of hip
- Pain with resistance against straight hip flexion
- Describe snapping/catching symptoms in anterior aspect of hip
Gluteal Tendon Tears

Overuse tendonitis, tears, or avulsion injuries

- Hip Abductors (Gluteal Minimus/Medius)

  Presents as lateral hip pain

“Rotator Cuff of the Hip”
Piriformis Syndrome
Piriformis Syndrome
Piriformis Syndrome

- Sciatica-type radicular symptoms - very difficult to differentiate from lumbar etiology
- Very specific symptoms of focal radicular symptoms with prolonged sitting with associated distal paresthesias
Layered Approach to Evaluating the Hip

4. Neural Layer
   - Thoracolumbosacral plexus
   - Peripheral nerves in lumbopelvic tissue and lower extremity
Making the Right Diagnosis

- Precise History
- Proper Clinical Exam
- Imaging
- Diagnostic Injections
Key Points

- Hip Mechanics and the evaluation of the patient with hip pain is very complicated
- Making the right diagnosis depends on a detailed history, physical, and proper imaging
- Patient selection is key to avoid failures