Hip Arthroscopy: The Basics
Jon Henry, MD

Expanding Field of Sports Medicine

Overview
- Review normal hip anatomy
- Review hip disorders amenable to arthroscopic surgery
- Discuss causes of mechanical pre-arthritic hip pain
  - Review patho-morphologic (pre-disposing) Anatomy & Radiographic findings
- Discuss clinical evaluation
- Describe arthroscopic method
Disclosures/Confessions

• None related to $ or industry relationship
• Few borrowed slides
• The information presented may be understood differently in future
• Portion of presented information is biased towards *my own philosophy*

Before we take off…

Start with the basics…
Hip Anatomy

- Central compartment
  - Articular cartilage lesions: Traumatic vs Atraumatic
  - Labral tears
  - Femoral-Acetabular Impingement (FAI): CAM, Pincer, Mixed
  - Loose Bodies
  - Ligamentum teres tears
  - Joint infection
  - Prosthetic Joint disorders

- Peripheral compartment
  - FAI: Cam, Pincer, Mixed
  - Sub-scap (AIIS) impingement
  - Instability
  - Synovial conditions
  - Adhesive capsulitis
  - Iliopsoas tendon pathology

Peritrochanteric disorders:
- ITB friction syndrome; ITB snapping hip; Trendelenburg, abductor tendon pathology

Gluteal space disorders:
- Piriformis tendon disorders
- Sciatic nerve entrapment

Hip disorders amenable to arthroscopic surgery:
Most labral tears & pre-arthritic cartilage lesions are related to pre-disposing bony conditions...

**Pre-disposing Patho-Anatomy**

- **Shallow socket** → under-coverage
  - ↑ contact pressures
  - Static overload
  - Cartilage degeneration
  - Labral hypertrophy & degenerative tearing
- ↓ contact area
  - Instability
  - Subluxation
- Early onset DJD

**Acetabular Dysplasia**

- Shallow socket → under-coverage
- ↑ contact pressures
- Static overload
- Cartilage degeneration
- Labral hypertrophy & degenerative tearing
- ↓ contact area
- Instability
- Subluxation
- Early onset DJD

**FAI**

Repetitive dynamic conflict between acetabulum & femur

- **Pincer**
- **Cam**
**Pincer Type**

- Impingement caused by overhanging anterior acetabular lip
- Primary labral pathology
- Secondarily develop articular cartilage breakdown
contre-coup
**Cam type**

- Impingement from bony prominence of anterolateral femoral head/neck junction
- Selective articular delamination (relative labral preservation)
Mechanical Causes of Hip Pain

- Dynamic factors
  - Overcoverage (FAI)
- Static factors
  - Undercoverage (dysplasia)
- Combined factors

### Mechanical Considerations in Evaluation of Hip Pain in Pre-Arthritic Patient

#### Dynamic Factors
- FAI
  - Cam lesion
  - Rim lesion (pincer)
  - Focal rim lesion (cephalad retroversion)
  - Global retroversion
  - Profunda
  - Protrusio

#### Static Factors
- Dyplasia
  - Lateral acet undercoverage
  - Anterior acet undercoverage

- Femoral valgus
- Femoral anteverision

### Combined Patterns
- Impingement with femoral retroversion
- Paradoxical acetabular dysplasia with FAI

### Compensatory Injury Patterns with FAI
- Sports hernia and athletic pubalgia
- Osteitis pubis
- SI joint
- Muscle injury
- Posterior hip subluxation

### Pearls and Pitfalls
1. Preoperative recognition of the abnormal mechanical factors, as well as intraoperative exposure, visualization, and thorough resection of the offending osseous lesions, is critical to a successful clinical outcome.

2. Isolated treatment of labral pathology with failure to address underlying bony impingement lesions is the most common reason for unsuccessful surgical treatment of FAI.

3. Compensatory motion due to abnormal hip kinematics may adversely affect the dynamic muscle forces in the pelvic region, resulting in secondary adductor, groin, lumbar, and pelvic pain syndromes.

4. In the setting of FAI, the recognition of femoral retroversion is essential, because it amplifies the effect of focal mechanical impingement by rotating an anteromedial cam lesion into the socket before the initiation of hip flexion.

5. Certain complex, combined patterns of mechanical hip deformity may be best addressed with open surgical dislocation and/or osteotomy procedures or with a combination of open and arthroscopic approaches.

6. There is a high co-occurrence of athletic pubalgia and symphyseal stress reaction in patients with FAI, which may result from abnormal motion of the hemipelvis due to restriction of terminal flexion and internal rotation of the hip joint.
Dealing with hip patients requires *thoughtful* (& humble) approach…

- New & changing information
- Hip ≠ shoulder, knee
- Complex nature of hip/pelvis sx’s
- Longstanding sx’s
  - Failed previous treatments
- Secondary sx’s
  - ITB, SI Joint, LS spine, sports hernia, athletic pubalgia, osteitis pubis
- Understand pre-disposing patho-morphologic factors
  - Spectrum from dysplasia → impingement
- Comprehensive treatment approach
  - Open vs Arthroscopic surgery, CPM, Brace, Rehab
- Reasonable expectations
  - Poor outcomes with DJD
- Unknown natural history
  - Lack of long-term outcome studies

Process in evolution…

Clinical evaluation

*(the challenging part)*
**Patient History**

- Onset of symptoms
  - +/- trauma
  - Activity or position related
- Duration, Location of pain
  - Deep, groin, intermittent, sharp
  - Not rest pain
- Aggravating factors
  - Torsional, flexion, strenuous WB activities
- Stiffness, progressive loss of motion
- Mechanical symptoms & location
- Limp
- Functional status, QOL compromise

---

**Physical Examination**

- Ref: Martin et al. *Arthroscopy*, vol 26, 2010
- Standardized approach, bilateral exam
- Include evaluation of gait, balance, LS-spine, SI joint, piriformis, hip abductors, peri-troch region & IT band, Hip (palpation, A/P ROM, strength, provocative tests)

---

**Physical Examination**

FAI evaluation

*Anterior impingement sign* (left) is positive, with painful forced IR in 90° flexion (left).

*In extreme forms, there is obligate passive external rotation with hip flexion* (“Drehmann” sign; center)

*Posterior impingement* sign is positive when there is painful forced ER & maximal extension (right).
Radiograph Evaluation of the Hip

- True AP Pelvis
- Lateral
- +/- False Profile

Careful analysis of plain x-rays

1. (Wiberg) Lateral Center Edge angle (LCA) >25° normal
2. Neck-Shaft angle
Lateral view measurements:

- Head-neck offset
- Alpha angle < 55° normal

Anterior Center Edge Angle (ACA) >25 normal

Standardize protocols
Insight & skill result from knowledge, practice, & experience...

Cam impingement
Abnormal extension of physeal scar laterally

Os Acetabulum, rim fracture
Often related to pincer FAI
Herniation pit related to CAM FAI

Pincer FAI related linear indentation lesion

Investigative Studies

- Radiographs most important investigative tool
  - Poorly indicative of problems amenable to arthroscopic intervention (??)
    - McCarthy & Busconi
    Ortop '95
  -Insensitive indicator of early OA
    - Santori & Villar
    Ortop '99
CT

- Better at assessing bony architecture / integrity
- 3-D reconstruction especially useful for bony morphology (i.e., FAI)
  - +/- femur images

CT

- Protocol to include measurement of femoral version
  - Include axial cuts thru femoral condyles

MRI

- Most sensitive at detecting labral lesions
- Insensitive at detecting articular lesions
- Statistically, majority of labral lesions (55%) will have associated articular cartilage damage
**MRI-A**
- More sensitive detecting labral tears & articular lesions
- Always inject marcaine along with contrast!
  - Response to anesthetic effect 90% reliable indicator of presence of joint pathology

**Radionuclide Scans**
- Inexpensive
- Sometimes sensitive indicator of altered joint homeostasis
- Useful survey tool

**Clinical evaluation of hip patients**
- Comprehensive approach
  - May take more than 1 appointment/test
- Importance of diagnostic injection to localize “pain generator”
- **TEAM** approach
  - RN/PA, PT, XRay tech, radiologist, Physiatrist, general surgeon, GYN
Good outcomes = proper pt selection + excellent surgical skill

Proper training
- Mentorship
- Cadaver lab workshops

Know limitations

Hip Arthroscopy

Minimally invasive to reproduce & expand upon open treatment methods using arthroscopic technique

- Better visualization
- Less morbid
- Fewer complications
- Less pain, easier recovery
Hip Arthroscopy

- Specialized instruments
  - 70 & 30 degree scopes
  - Shavers (straight & curved)
  - Burrs
  - Bitters (back & curved)
  - Radiofrequency heating probe
  - Long cannulas
  - Labral repair system

Hip Arthroscopy

- Spinal &/or general anesthesia
  - paralysis
- Supine or lateral position
- Large padded, lateralized post
- Distraction system
  - Ability to disengage & move hip
  - Adequate joint distraction
  - Traction time ≤ 2 hours
- C-arm fluoroscopy
Hip Arthroscopy

- Portal placement
  - ant-lat, mid-ant
  - accessory portals prn
- Tips to avoid labral penetration
- Start with 70° scope ant-lat portal into central compartment
- Switching sticks & slotted cannulas

Capsulotomy

- Leave 1 cm capsule off labrum
- Extent
- Standardized diagnostic scope
- Switch portals
- Switch 70/30 degree scopes
- Beware of scuffing
- Watch I/O's

Central compartment exam

- Anterior capsulotomy
• Assess labrum, chondral-labral junction, acet rim

• Ligament teres, fossa contents
• Iliopsoas tendon

Peripheral compartment evaluation & treatment

- Correlate findings with pre-op information
- Identify & protect lat retinacular vessels
- Use intra-op fluoro to assess lesion/treatment
- Reproduce & visualization impingement position
Completion & Closure

- Remove all debris
- ? Capsular closure
- Brace
- HO prophylaxis
- DVT prophylaxis

Thank you