Hip Arthroscopy:

Studies Based on 750 Consecutive Cases
Patient Positioning: Hip Arthroscopy

- Supine on fracture table; both feet placed in traction

- Distraction of $\geq 1\text{cm}$ is needed to proceed with scope

- Traction (25-50 lbs.) is put on the operative extremity

- Several portals are needed to get to all areas of the joint

Arthroscope: 4 mm, 70°
Peripheral Arthroscopy: The Present

- Hip: neutral rotation; 45° flexion (relaxes capsule)

- Portals two: anterolateral and mid-anterior portal

- Goal: better view antero-superior CAM osteophyte
Hip Arthroscopy Techniques:
Where and What Can We “Fix”

- Central Hip Joint
- Head & Neck Area
- Iliopsoas Insertion
- Boney Impingement
- Iliopsoas Tendinitis
- Labral Flap Tear
- Boney Impingement
- Iliopsoas Tendinitis
Hip Arthroscopy Techniques:
Peripheral Arthroscopy: The Future

- Trim anterior inferior iliac spine (pincer impingement)
- Partial ostectomy of inner edge of lesser trochanter
- Arthroscopic debridement of the symphysis pubis
What is the average age of patients having hip arthroscopy?

- ≤ 20
- 30-39
- 40-49
- 50-59
- ≥ 60
Hip Arthroscopy

- Average age: 38 yrs. (range 12-73 years)
- Gender: 240 males, 510 females (68%)
- Hip scoped: 292 lefts, 458 rights (61%)

750 Consecutive Cases
Who Are Not Candidates for Hip Arthroscopy

- Generalized obesity: Thigh circumference ≥ 32 inches
- Degenerative joint disease & no mechanical symptoms
- No pain relief with hip joint anesthetic injections

28 year-old male
Acetabular Labral Tears
Facts About the Labrum

Many Similarities to The Meniscus in the Knee

- Fibrocartilagenous structure
- Most of labrum is avascular, vessels penetrate only 0.5 mm
- Contains free nerve endings and sensory end organs
- Nerves endings greatest in superior and anterior quarters
- Tears get trapped, cause pain like meniscus tears in the knee
- Many Similarities to The Meniscus in the Knee
Labral Facts & Fiction

Lecouvet, *AJR.* 1996

- MRI’s in 200 volunteers
  - Mean age: 44 years
  - Men 84; Women 116

- MRI’s in 46 volunteers
  - Mean age: 41 years
  - Men 24; Women 22

- Range 16-83 yrs.


- Shape/presence of labrum?
  - Triangular: 79% → 41%
  - Absent: 5% → 40%
  - Round: 11%
  - Flat: 9%
  - Cleft: 15%

Lecouvet, *AJR.* 1996

- Triangular: 79% → 41%


- Absent: 5% → 40%
MRI appearance of labrum

Changes with age  24 yrs.  65 yrs.

Homogeneous:  71%  22%
Heterogeneous:  16%  68%
Labral tears:  13%  27%

Normal variations or silent lesions?
Large variability must be considered
Diagnosis based on clinical presentation
Labral Facts & Functions

Very Different Functions From The Meniscus in the Knee

- Grasps head, seals the joint, but does **not** distribute loads applied

- Partial or complete removal of the labrum does **not** change contact area or pressure between the head of the femur and the acetabulum

Treatment of Labral Tears
Standard Approach Has Been Partial Excision

- Goals of partial excision
  - Resect damaged tissue
  - Preserve capsular attachment
  - Maintain joint sealing function

Labral Flap Tear
Horizontal Tear
Clinical Results Labral Tear Excision
How are we doing?

- **Labral debridement in hips without arthritis:**
  - Good outcomes in 83% at 10 years (52 hips)
  - Athletes: 87% return to sport, but 33% had THA at ≥ 6 years
  - Labrum an “innocent by-stander” must treat FAI, dysplasia

- Presence of arthritis poor prognostic indicator:
  - In 33%, diagnosis made at arthroscopy (not by x-ray or MRI)

Byrd JWT. “Hip Arthroscopy in Athletes: 10-Year Follow-up”
*Am J Sports Medicine, 2009*

15 Athletes: 2 College, 4 H.S.

- Conversion to THA in 88% @ 10 years
- Large, unsolved problem; Stop progression if we treat FAI?
- Excised labrum/tested 6 hips
- Intra-articular joint effects:
  - Hydrostatic pressure lower
  - Joint lubrication decreased
- Effect on cartilage layers:
  - Fatigue failure of collagen matrix
  - Frictional wear of surface cartilage
  - Fibrillation and delamination
- Early onset symptoms of DJD?

Labral Facts & Functions

Very Different Functions From The Meniscus in the Knee

- Grasps head, seals the joint, but **does** distribute loads applied
- Partial or complete removal of the labrum does not change contact area or pressure between the head of the femur and the acetabulum
- Maintains hydrostatic pressure and spreads loads (shock absorber)
- Enhances joint lubrication and is the key to cartilage nutrition
Labral repair outcomes

- Results: 67% success at 6 months
- Repair gives better results in FAI
- Failures cause 33% of 2nd scopes

Labral healing potential similar to menisci

- Vascularity greatest at capsule attachment in peripheral 1/3
- Peripheral tears have potential to heal, should be repaired

Kelly, *Arthroscopy*, 2005
Outcomes: Labral Replacements

“Arthroscopic Acetabular Labral Reconstructions Using Iliotibial Band Autograft: Early Outcomes in the Athlete”

Marc J. Philippon, MD, Connor Hay, BA, Karen K. Briggs, MPH
Steadman-Hawkins Research Foundation
Vail, Colorado
RESULTS: Labral Replacements

- 49 athletes had IT Band labral reconstructions
- Average follow-up was 17 months (12 - 32 mos.)
- MHHS improved from 62 points to 81 points
- Three patients had a THR within one year
Clinical Presentation

- May have sharp **catching** pain, popping & sensation of locking
- Majority have more **subtle**, **dull**, activity-induced, positional pain

- Patients often describe a **“deep”** discomfort in the anterior groin
- What % of patients have **lateral**, deep in the heal or **buttock** pain?
Hip Pain Referral Patterns in Patients with Labral Tears: Analysis Based on Intra-articular Injections, Hip Arthroscopy, and a New Pain “Circle” Diagram

Douglas R. Arnold, MD, James S. Keene, MD, Donna G. Blankenbaker, MD, and Art DeSmet, MD

Division of Sports Medicine
Department of Orthopedic Surgery and Rehabilitation
University of Wisconsin

INTRODUCTION

- Patients referred for hip arthroscopy often have an MRI that shows a labral tear and pain in the buttock, back, and greater trochanteric areas. They arrive expecting that surgery for their labral tear will treat their “hip” pain.

- This study was initiated and the “circle” diagram created to help physicians reconcile the often unrealistic expectations of patients with labral tears who believe that hip arthroscopy will treat their multiple areas of “hip” pain.
Patients and Results

**Patients:** 52 with MRA ropivicaine hip injections

- Completed our pain “circle” diagram (PCD)
- Had $\geq 80\%$ pain reduction in a circled area
- Arthroscopy confirmed labral tear and minimal DJD
The FGIA's anesthetic injections and pain circle diagram helped define the pain referral patterns of patients with labral tears.

- The most common areas of referred pain associated with labral tears were the groin (73%) and the greater trochanter (44%).
- The least common areas of referred pain were the thigh (8%) and ischial tuberosity (12%), two areas common with DJD of the hip.
- Results of this study may help physicians define for patients what components of their hip pain are related to their labral tear.
Imaging Labral Pathology
The Past: What Doesn’t Work….

- **Plain films:** limited views
  - Up to 79% have abnormalities
  - **FAI** only seen on specific views
- **Non-contrast MRI’s:**
  - May miss ≥ 60% of labral tears
  - Does **not** ID hip as pain source
- **Asymptomatic tears occur**
  - MRI’s show ≤ 27% in controls
  - Don’t base surgery on MRI
Imaging Labral Pathology
The Present: What Does Work

- **Plain films**: A-P, cross-table/frog-leg lateral, & “special” views

- **MRA**: 0.5% ropivicaine (10cc), normal saline (5cc), and gadolinium (0.1cc) into hip joint; patient given pain scoring sheet

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Snapping Iliopsoas Tendon

- **Causes:** sports (82%), trauma (11%), hip scope (7%), THR

- **Audible snap:** present in 75%

- **Gait:** shortened stride to avoid, & prevent hyperextension of hip

- **Diagnosis:** overlooked in athletes, post-arthroscopy & THR patients
Iliopsoas Tendinitis
(Complication of Total Hip Replacement)

- Patients complain of **groin pain** with use of the iliopsoas muscle
- Pain with **straight-leg raising**, and **active hip flexion** activities
- Pain on **ascending stairs**, lifting leg into bed or into or out of a car
- **No pain** with level walking as seen in septic or aseptic loosening

Post-op onset: 1-96 months

Patients rarely describe snapping
Why are patients developing iliopsoas tendinitis after hip arthroscopy when they had no preop iliopsoas problems?

- **Goal:** Determine which rehab exercises will strengthen the gluteus medius and prevent overuse of the iliopsoas muscle.

- **Method:** Used EMG to determine gluteus medius and iliopsoas muscle activity during 13 hip rehab exercises.
Table 1. Anatomic motions, body position, GMED EMG Intensity, GMED rank order and ratio of GMED to ILI muscle activity.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Leg Bridge</td>
<td>12:1</td>
</tr>
<tr>
<td>Hip flexion/Knee flexion/Knee extension</td>
<td></td>
</tr>
<tr>
<td>Leg Raise-IR</td>
<td>7:1</td>
</tr>
<tr>
<td>Heel Squeeze</td>
<td>14:1</td>
</tr>
</tbody>
</table>
Clinical Presentation

- Painful repetitive snapping sensation in the groin area
- Snapping provoked by walking, running, kicking, and gymnastics
- Pain also from simple activities as putting on socks, rising from chair
Imaging protocol

- **MRA**: 0.5% ropivicaine (10cc), normal saline (5cc), and gadolinium (0.1cc) into hip joint; **Limited** relief of their hip pain

- **Ultrasound**: a *diagnostic anesthetic injection* into bursa & *real-time imaging* to look for snapping of the iliopsoas tendon
Iliopsoas Tendon Release

Arthroscopic Technique
Central Iliopsoas Impingement


- Anterior Labral Tear
- Central Release Site
- Central Iliopsoas Tendon Release
Treatment Painful Snapping Tendon
What Works and What Doesn’t Work

- **Iliopsoas Release**: Is Weakness a Problem

- **Iliopsoas Snapping**: Do Injections Work
Painful, Snapping Iliopsoas Tendon

Injections **Do Work**; Open Surgical Releases **Do Not Work Well**

- Nonoperative treatment, which includes stretching and iliopsoas bursa injections, is successful in **80%** of cases

- Classical surgical approaches are open procedures that release or lengthen the tendon; complications in **51%**
Arthroscopic Treatment of the Painful “Internal Snapping Hip: Results of a New Endoscopic Technique and Imaging Protocol
ME Flanum, MD, JS Keene, MD, DG Blankenbaker, MD, AA DeSmet, MD

Results of Arthroscopic Iliopsoas Tendon Release in Competitive and Recreational Athletes
Scott A. Anderson, M.D. and James S. Keene, M.D.
STUDY POPULATIONS:

**Athletes (15):** 2 college, 3 high school, 10 recreational
- Avg. age: 17.4 yrs. competitive, 38 years recreational
- 5 women competitive, 6 women/4 men recreational

**Patients (50):** Average age 35 years (range 15-62 years)
- Mean duration snapping 12 months (8-20 months)
- There were 40 women and 10 men
At 24 months, the scores of the remaining 49 patients averaged 92 points (range 59<a>-100 points)

(aThe patient that scored 59 points had recurrent snapping and a second arthroscopic release 25 months after the first; her score two years after the 2nd release was 93 points)

At 12 months hip scores averaged 90 points (range 45*-100)

(*The patient that scored 45 points had a total hip replacement 14 months after his tendon release due to increasing pain from progression of his DJD)
RESULTS IN ATHLETES

- Their 6 & 12 month scores averaged 96 points (range 92-100)

Release Results: Harris Hip Scores

- Pre-op: 41
- 6 weeks: 75
- 3 months: 89
- 6 months: 96
- 12 months: 96
Results of Arthroscopic Release
(Minimum two-year follow-up)

- Competitive athletes back to their preop sports ≤ 9 months
- One woman was back running 4 miles/day, 4 months post-op
- One returned to Division-1A soccer 4 months after surgery
- None had hip weakness, portal problems or recurrent snapping
Femoroacetabular Impingement

“...has become recognized as a cause of joint damage and osteoarthritis in young adults.”

Ganz, Clin Orthop, 2003
CAM-Type Impingement

- “Bump” on femoral neck abuts against acetabulum
- Articular cartilage faces repetitive shearing forces
- Surface cartilage delaminates but labrum often is preserved
- Retroversion ↑, anteversion ↓ conflict with same α-angle
Pincer-Type Impingement

- Caused by overhanging of the anterolateral rim
- Primary result is a breakdown of the labrum
- Over time there is also variable articular damage
- Articular damage more severe with CAM lesions
Not just an overhanging acetabular rim problem

Term “Pincer” does not capture the problem

Global problem: coxa profunda, protrusio

True retroversion is not just an increased overhang
FAI: Current Frontiers and Concepts

- Current concepts on causes of FAI
  - Pediatric deformity known cause
  - Genetic relationship being established
  - Repetitive *sports-use* an accepted cause
  - Osteitis, sports hernias are related to FAI
Genetic Influences in Etiology of FAI  
(Siblings 192 Hips, Controls 154 Hips)

- CAM and Pincer lesions diagnosed
- Results for CAM deformities ($p < 0.05$)
  - Sibling risk 3X higher than controls
  - Brothers (3.2 vs. 2.3) at greatest risk
- Results for Pincer deformities
  - Sibling risk 2X higher than controls
  - Sisters (2.6 vs. 1.4) at greatest risk
- Risk of Osteoarthritis
Summary: Genetic Etiology of FAI

- **CAM deformity** has a genetic predisposition
  - High incidence in sibs but often an absence of clinical signs
  - Is deformity present at conception or acquired by puberty?

- **Pincer deformity** is ± inherited but risk less than CAM
  - Siblings of females much higher rate of Pincer morphology
  - No male probands had pure pincer morphology, ? 2º change
Imaging Studies: Present and Future

- 3-D CT Reconstructions…the present:
  - Clearly show us the *extent and location* of the “bumps”
  - Does *not* tell us if “bump” contacts acetabulum on motion

- 3-D CT Virtual Reconstructions…the future:
  - Do show if, and in what position boney collisions occur
  - Key in preop planning; shows which “bumps” to excise
delayed Gadolinium Enhanced MRI of Cartilage
- dGEMRIC estimates GAG distribution in articular cartilage
- Uses T1 mapping of the penetration of gadopentetate-DTPA
- Loss of glycosaminoglycan (GAG) is an early event in OA
**FAI: Use of dGEMRIC Studies**

- **History:** 14 y/o female with R “impingement” hip pain

- **MRI:** Coronal cuts show articular cartilage changes

- **X-ray:** X-table lateral shows Cam-type FAI deformity

- **Scope view:** deep fissures in acetabular cartilage

- **Initial Study**

- **Year Later**
Association of Hip Pathology and Pubalgia in Athletes: Surgical Treatment

- Hip pathology and Pubalgia
  - 27 athletes (pro & college level)
  - All had pubalgia, 96% had FAI
  - Outcomes assessed with SF-12, VAS, and Harris Hip scoring

Larson, et al. AAOS, 2011
Association of Hip Pathology and Pubalgia in Athletes: Surgical Outcomes

- Results pubalgia surgery alone
  - 13 (81%) had continued pain
  - 11 (68%) later had hip arthroscopy

- Results hip arthroscopy
  - Scope alone successful in 2 of 4
  - Best results doing both surgeries
  - Return to prior sports in 95%

- Conclusions
  - ↓ ROM due to FAI causes ↑ motion at symphysis and pubalgia
  - Failure to manage both disorders leads to suboptimal results

Larson, et al. AOSSM, 2011
Hip Arthroscopy
The Past, The Present, and The Future

Thank You for Your Attention
Thank You

University of Wisconsin Sports Medicine Center