Diagnosis and Treatment of Hip Injuries in Figure Skaters

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Extra-articular or Intra-articular?

Hip Injuries in the Athlete

- Contact sport
- Repeat rotational maneuvers
  - Adduction
  - Abduction
  - IR and ER
- Falls
- Lateral impact injury
- Forceful contractions combined with limited anatomy

Possible Other Issues

- Eating disorders
- Amenorrhea
- Osteoporosis
- Psychological issues
### Imaging of Groin Pain

- **Musculotendinous injuries**
  - Ultrasound – high resolution scan
  - MR groin – axial / coronal STIR, Sagittal T1, T1/T2FS coronal oblique / Sagittal Sequences 4mm slices
- **Hernia**
  - High resolution ultrasound

### Hip Flexor / Groin Strains

- Strains of hip flexors or adductors are common in the athletic population
  - Micro-tearing of the musculo-tendinous unit:
    - Forceful contraction
    - Repetitive stretching
      - Common position → ER and extension
  - Strain can be felt as a sudden sensation of tearing or twinge during activity

### Adductor Tendinopathy

- Preseason hip strength testing of professional hockey players can identify players at risk of developing adductor muscle strains
- A player was 17 times more likely to sustain an adductor muscle strain if the adductor strength was less than 80% the abductor strength

### Acute and Chronic Adductor Injuries

- Types of adductor longus injuries
  - Bony avulsion
  - Avulsion fibro-cartilage
  - Tear of musculotendinous junction
    - Overstretching
    - Bruising of inner thigh

*Tyler et al. AJSM, 2001*
**Groin Pain Treatment Algorithm**

- How long symptomatic?
- Failed Conservative therapy
  - NSAID's?
  - Strengthening / Physical therapy
- Imaging
  - X-ray
  - MRI
  - CT

**Evidence**

- In a prospective cohort, long-standing groin pain – most commonly associated with hip pathology

- Persistent sports related groin pain was frequently caused by intra-articular hip disorder. Following hip arthroscopy athletes returned to sport
  (Bohnsack M, Sportverletz Sportschaden, 2006)

**Causes of Hip Pain**

- Acetabular labral tears are a common cause of groin pain in athletes
- Reduction in hip range of motion was evident in athletes with chronic groin injury

Narvani et al. KSSTA 2003
Hip Strength Deficits Present in Athletes with an Acetabular Labral Tear Before Surgery

Presented at annual meeting of Arthroscopy Association of North America, 2004

Introduction

Acetabular labral tears among athletes are becoming more recognized due to the advancements in diagnostic and treatment methods.

Superior/anterior labral tear (most common)

Symptoms
- Audible, painful “pop”
- Abducted and externally rotated gait
- Impingement in deep hip flexion
- Pain when arising from a chair
- Pain when getting in and out of a car
- Low back pain
PURPOSE

• To determine if hip strength deficits on the involved leg as opposed to the contralateral leg exist in athletes with a history of acetabular labral tears

SUBJECTS

• Pre-operative group (Pre-OP):
  – 22 subjects
  – 44.7 ± 8.5 years, 176.0 ± 9.5 cm, 81.8 ± 15.1 kg

• Post-operative group (Post-OP):
  – 23 subjects
  – 42.5 ± 10.4 years, 178.3 ± 12.0 cm, 83.1 ± 17.4 kg
  – 5.8 ± 3.8 months after surgery

METHODS

• Bilateral isometric hip strength was tested with the hip joint in neutral position using Biodex III
  • Variables:
    Peak torque/BW of Hip abduction Hip adduction

RESULTS

p < 0.05

*
The results indicate that athletes with an acetabular labral tear without surgical treatment possess a hip adductor strength deficit on their involved side.

Future study to investigate hip abductor and adductor strength in functional positions may provide more information for athletes to improve their muscle strength for their sports.

1995-Present

• My Experience
  – 3300 hip arthroscopies
  – 80% athletes
  – 396 elite athletes

Other Things to Consider

• Patients with underlying FAI
  – Restricted internal rotation
  – Compensation by SI joint and low back
  – Mechanical block
  – Forceful adductor muscular contraction
  – Adductor weakness
Indications for Hip Arthroscopy

- Femoroacetabular impingement
- Acetabular labral tears
- Chondral lesions
- Capsular laxity
- Ligamentum teres pathology
- Snapping hip syndrome
- Loose bodies

Intra-articular Hip Injury Patterns in Olympic/Professional Ice Skaters

Purpose

The purpose of this study was to describe patterns of intra-articular hip injuries identified at arthroscopy in ice skaters.
Results

- 10 hips
- 8 females & 1 male professional skaters
- Underwent arthroscopy for the treatment of intra-articular hip pathologies
- Age ranged from 14 to 64

Hip Pathologies

- Impingement
- Labral tears
- Chondral injury
- Torn ligamentum teres
- Capsular laxity
- Dysplasia
- Synovitis

FAI

- Overlap between FAI and pubalgia/sports hernia
- Need to restore normal hip function by treating FAI to unload the core complex and help in resolving factors that contribute to excess stress at the pubis and abdominal wall

The Problem

- The bump produces a shearing force, displacing the labrum toward the capsule and the adjacent articular cartilage into the joint.
- With repeated insult, the labrum may completely detach from the acetabular rim, and the cartilage may fully delaminate.
  - Predisposing to arthritis
Femoroacetabular Impingement
Lavigne et al. 2004

The Bump

• Range of Motion Deficits
  - Loss of internal rotation, external rotation, and abduction
Prevalence of FAI in Professional Athletes

- In a series of 100 normal control hips, 10% had femoral head abnormality.
  Murray and Duncan, JBJS Br 1971
- However, our recent work has shown that it is higher in professional athletes.
  ➔ 30-45% in professional football and hockey players.
  Philippe et al, KSSTA 2007

The Answer

- Intervene early, stop the progression to early arthritis.
- The earlier we intervene, the quicker they get back and the longer they play.

Advantages of Hip Arthroscopy to Treat FAI

- No need for osteotomy
- Less invasive
- Physiologic
  - No disruption of structures
- Dynamic analysis without muscular disruption from trochanteric osteotomy
- Allow for access of acetabular rim
- Faster recovery (Bizzini M, et al, AJSM)

Advantages of Arthroscopy to Treat FAI

- Dynamic analysis
  - Reproduce sport specific movements
    - Flexion
    - Abduction
    - Adduction
    - Internal rotation
    - External rotation
Physical Exam

Anterior Impingement: Flexion+IR

Posterior Impingement: Extension+ER

Leunig et al. Op Tech Orthop 2005

Physical Exam

FABER Test

Contralateral Hip

Affected Hip

Philippon et al. AJSM 2007

Physical Exam

• Faber test
  • Hip pain / SI joint pain / Asymmetry

Negative FABER – ( symmetric flexion, abduction, external rotation without pain)

Positive FABER - (decreased flexion, abduction, external rotation of the affected side +/- pain)

Positive FABER test in 97% of patients with impingement

Clinical Presentation of FAI

KSSTA, 2007

Imaging

• Supine AP pelvis
  • Acetabular version
  • Acetabular depth
  • Superior femoral head-neck offset

• Cross-table lateral
  • Anterior femoral head-neck offset

• MRI
  • Alpha angle
  • Fibrocystic changes at the femoral neck
  • Associated soft tissue pathologies
Anterior Head/Neck Offset

Professional hockey player c/o R hip pain

Pre-Osteoplasty
Post-Osteoplasty

Imaging
Measurements

Normal Offset
Decreased Offset

Normal alpha angle
Increased alpha angle

Alpha Angle

• Larger alpha angles associated with:
  – Decreased ROM:
    – Hip flexion
    – Internal rotation
    – External rotation
  – Operative findings:
    – Large acetabular chondral defects (>1.5 cm)
    – Full-thickness acetabular chondral lesions

Notzli et al. JBJS Br. 2002
Johnston, Philippon et al. Arthroscopy 2008;24:669-675
### FAI Clinical Presentation

- Most frequent presenting complaint was pain, with 85% having moderate or marked pain
  - Anterior groin (78%)
  - Lateral trochanteric (64%)
  - Deep posterior buttock (52%)
- ADL limitations: heavy work (68%), walking for >15 minutes (55%), rising from sitting (45%), light to moderate work (35%), getting in and out of a car (34%)

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### FAI Range-of-motion

- Significant decrease in ROM when injured hip is compared to non-injured hip:
  - Flexion (112 degrees), 9 degrees less (p<0.001)
  - Abduction (40 degrees), 5 degrees less (p<0.001)
  - Adduction (19 degrees), 3 degrees less (p<0.001)
  - Prone IR (31 degrees), 5 degrees less (p<0.001)
  - Prone ER (38 degrees), 4 degrees less (p<0.001)
Labral Pathology

Introduction

- Labral tears increasingly recognized as source of hip pain in the athlete
- With advent of hip arthroscopy, a more frequent finding
  - Present in up to 90% of arthroscopies for hip pain
  
  Kelly, Philippon et al. Arthroscopy 2005

Role of Labrum

- Extension of Bony Acetabulum
- Suction effect
- Tear
  - Loss of suction effect
    - Resulting in relative instability
  - May result in capsular attenuation and laxity

Role of Labrum

- Cartilage contact stress plotted at t=1000 s and t=10000 s after load of 0.75 times bodyweight.
- Dark grey – intact labrum
  Light grey – without labrum
- Contact stresses in acetabular cartilage increase with time, and up to 92% higher in the absence of the labrum

Ferguson et al. J. Biomech 2000
**Vascularity of the Labrum**

- Capsule provided major contribution to the labrum
- Capsular side of the labrum demonstrated significantly more vascularity than the articular side (p<0.005)
- Capsule was the only source of vascularity in 11/12 hips

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**Acetabular Labrum**

- Extends the acetabulum beyond the bony socket
- Is present around all of the articular cartilage of the acetabulum
- Is continuous with the transverse acetabular ligament inferiorly

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**Location of Labral Tears**

Most labral tears occur between the 10 o’clock to 2 o’clock position

6 o’clock = middle of the transverse acetabular ligament
12 o’clock directly opposite the transverse acetabular ligament, in the position of the stellate crease

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**When to repair the labrum**

- Address concomitant pathology (PAL, instability)
- Take into consideration the chondral/osseous interface

<table>
<thead>
<tr>
<th>Labral Condition</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detached</td>
<td>Repair</td>
</tr>
<tr>
<td>Degenerated</td>
<td>Debridement only if enough substance</td>
</tr>
<tr>
<td>Bruised</td>
<td>Rim reduction and refixation if grade IV</td>
</tr>
<tr>
<td>Torn</td>
<td>Debridement only if enough substance and cam Rx</td>
</tr>
<tr>
<td>Large (&gt;7mm)</td>
<td>Repair and Augmentation</td>
</tr>
<tr>
<td>Small (&lt;7mm)</td>
<td>Repair and Augmentation</td>
</tr>
</tbody>
</table>


*Kelly et al., Arthroscopy 2005*
**Impingement & Labral Tears**

- Labral lesions
  - More common in patients with higher alpha angles ($56^\circ$ v. $50^\circ$). $p=0.027$
  - Labral detachment at base occurred with higher alpha angles ($57^\circ$ v. $51^\circ$). $p=0.016$
    - Associated with medium to large acetabular cartilage defects. $p=0.001$

  *Johnston T, Philippon M, et al. AANA Award Paper*

**Rationale for Labral Repair**

- Ovine model
- Unilateral arthroscopic labral repair
- 1.5-cm-long incision was made at the junction of the labrum and acetabulum
- The labral detachment was then repaired arthroscopically with a single suture anchor.
- No form of immobilization was used

*Philippon et al. Arthroscopy 2007*

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**Rationale for Labral Repair**

Healing of intra-labral lesion. The lesion is being repaired by fibrovascular scar (small arrows) migrating from the capsular surface of the labrum. (A, acetabular bone; L, fibrocartilaginous labrum.)

*Philippon et al. Arthroscopy 2007*

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**Rationale for Labral Repair**

- Revision hip arthroscopy
  - Reason for revision
    - 92% for impingement
    - 84% for labral pathology


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**Rationale for Labral Repair**

- In the Ovine Model arthroscopically repaired acetabular-labral lesions in sheep are capable of healing via fibrovascular repair tissue or direct reattachment via new bone formation (or both).

*Philippon et al. Arthroscopy 2007*
Hip Instability

Introduction

- Sub-group of patients with labral tears and chondral injuries
  - Report feelings of instability or giving way
  - Difficulty with prolonged standing
  - Capsular redundancy identified at arthroscopy

Philippon et al. ESSKA 2006

Role of the Capsule

- Proprioception
- Structural support
  - Iliofemoral (resists extension and ER)
  - Ischiofemoral (constriction)
  - Pubofemoral (resists extension and ABD)
Iliofemoral Ligament
- Originates at the AIIS and acetabular rim
- Two distinct bands
- Inserts along the intertrochanteric line
- Primary restraint against extension and external rotation

Ischiofemoral Ligament
- Originates from the posterior acetabular rim
- Courses spirally to insert on the medial part of the greater trochanter
- Primary restraint against hyperextension and internal rotation

Pubofemoral Ligament
- Originates at the superior pubic ramus
- Inserts onto the intertrochanteric line
- Primary restraint against hyper-abduction and external rotation

Etiology of hip instability:
- Ligamentous laxity
- Rotational sports
- Dysplasia: < 20°
Hip Instability
Focal & Atraumatic
• Common in high-level athletes involved in sports with repetitive hip rotation and axial loading
• Rotational, NOT translational type instability
• Associated with labral tears and elongation of the iliofemoral ligament

Radiographic Findings
• Lower center edge angle
• Higher Sharp’s angle
• Positive vacuum sign on gentle distraction
• Inclination of acetabular Sourcil (WBS)

Hip Instability
Diagnosis
• The dial test was designed to assess normal and pathologic iliofemoral ligament elongation
• Patient is supine and the examiner notes the degree of resting external rotation
• The knee is then captured and an external rotation torque is applied

Positive exam = increased resting ER without endpoint to ER torque

Pre-op Dial Test

Hip Instability
Classification of Hip Laxity

<table>
<thead>
<tr>
<th>Grade</th>
<th>Vacuum sign and/or laxity on axial distraction</th>
<th>Clinical Feel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (mild)</td>
<td>No (negative pain on axial distraction test)</td>
<td>Soft end point</td>
</tr>
<tr>
<td>2 (moderate)</td>
<td>Yes (positive pain)</td>
<td>+ Dial test</td>
</tr>
<tr>
<td>3 (severe)</td>
<td>Yes (pistoning &amp; pain)</td>
<td>+ Dial test Patient can demonstrate subluxation/dislocation (history of previous dislocation)</td>
</tr>
<tr>
<td>4 (collagen disease)</td>
<td>Ehlers-Danlos syndrome, Down’s Syndrome, Marfan syndrome</td>
<td>Upper extremities and lower extremity joint laxity</td>
</tr>
</tbody>
</table>

Acetabular and femoral neck version must be taken into account

Philippon et al. ESSKA, 2006

Philippon et al. Instructional Course Lecture, 2006
163 patients evaluated

- Sharps >42° or CE angle <20 - 3.8X more likely to report feeling of instability [CI 1.1 to 13.8]
- Sharps >42° - 5.2X more likely to have intra-operative capsular laxity [CI 1.7 to 15.6]

Philippon et al. presented at ISAKOS Annual Meeting, 2007

Significant relationship between positive log roll and the presence of capsular laxity (p<0.001)
- Sensitivity = 59.5%
- Specificity = 68.2%

Patients with a positive log roll test are 3.15 times more likely to have hip capsular laxity.

Philippon et al. ESSKA, 2006

Patients with iliofemoral, ischiofemoral, or global laxity diagnosed by arthroscopic probing
- Patients reported feelings of hip instability or giving way (p=0.013)
- Patients reported significant difficulty with prolonged standing (p=0.037)

Philippon et al. ESSKA, 2006

Suture placed at the interval between the iliofemoral and ischiofemoral ligaments

Performed to:
- Close capsulotomy
- Treat redundancy (along with thermal capsulorrhaphy)
In Vivo Healing Response After Capsular Plication in an Ovine Shoulder Model.

- No difference in histologic healing response
- Increased evidence of tissue injury in open shift group

Thermal Capsulorrhaphy

- Flexible RF probe set at 75°C and 40 W
- Cornfield-type passes made at the redundant capsule
- Color of tissue closely monitored to prevent excessive heating

Summary

- Rotational hip instability can be very disabling, particularly for patients with high athletic demands
- Specific diagnostic algorithms
- Capsular plication can restore rotational stability to the joint
- Thermal capsulorrhaphy can be a safe and effective treatment option for capsular laxity, given the relative thickness of the hip capsule compared to the shoulder capsule

Summary

- Balance and proprioception characteristics with labral pathology unclear and warrant further study.
- Kinematic differences healthy and labral injury elite players may be related protective mechanisms reducing forces that result in pain.
- Hip strength and stability permit generation of torque during the, decelerate femoral adduction and internal rotation.
Rehabilitation is CRITICAL to Success of Hip Arthroscopy

Post-operative Protocol
• Weightbearing
  – 20 lbs. flat foot for 2 weeks
  – With microfracture 8 weeks
• Continuous passive motion
  – 4 hours each day for 2 weeks
  – With microfracture 8 hours for 8 weeks

Post-operative Protocol
• Rotation precaution boots (Bledsoe)
  – Prevents hyperextension
  – For abduction and rotation control
  – At night for 14-21 days
• Brace (Bledsoe)
  – For muscle control and slight abduction
  – During ambulation for 14-21 days

Rehab Goals
4 Phases following Arthroscopy
• Phase I: Immediate
  – Post-op week 0 to week 4
• Phase II: Intermediate
  – Post-op week 4 to week 8
• Phase III: Advanced
  – Post-op week 8 to week 12
• Phase IV: Sport-specific
  – Post-op week 12 return to sport

*Post-operative weeks are approximate and patients should be transitioned based on the following specific criteria*
Rehab Goals
Phase I: Immediate

- Protect integrity of repaired tissue
- Diminish pain and inflammation
- Prevent muscular inhibition

Rehab Goals
Phase I: Immediate

- Restore ROM within restrictions
  - Flexion: 0 to 120° (14-21 days)
  - Abduction: 45° (14-21 days)
  - ER: 0° (14-21 days)
  - Extension: To neutral by week one; restricted 14 to 21 days
  - Emphasize circumduction

Rehab Exercises
Phase I: Immediate

- Isometrics: gluteal, quad, hamstrings, transverse abdominal, abductors, adductors, flexors
- Stationary bike
- Passive ROM
- Stool hip IR
- Circumduction

Rehab Summary
Phase I: Immediate

- Do NOT push through hip flexor pain
- Criteria for progression to phase II:
  - Minimal pain with all phase I exercises
  - ROM >85% of the uninvolved side
  - Proper muscle firing patterns for initial exercises
  - Do not progress to phase II until full weight-bearing is allowed
**Rehab Goals**
Phase II: Intermediate

- Protect integrity of repaired tissue
- Restore full ROM
- Restore normal gait pattern
- Progressively increase muscle strength

**Rehab Exercises**
Phase II: Intermediate

- 1/3 knee bends
- Core Stability
  - Advanced bridging (exercise ball)
- Stationary biking with resistance
- Dyna-disc single leg stance

**Rehab Summary**
Phase II: Intermediate

- No ballistic or forced stretching
- No treadmill use
- Avoid hip flexor/joint inflammation
- Criteria for progression to phase III:
  - Full ROM
  - Pain free/normal gait pattern
  - Hip flexion strength >80% of uninvolved side
  - Hip adduction:abduction ratio >80%

**Rehab Goals**
Phase III: Advanced

- More individualized
- Restoration of muscular endurance/strength
- Restoration of cardiovascular endurance
- Optimize neuromuscular control
Rehab Exercises
Phase III: Advanced

- Lunges
- Single knee bends
- Lateral agility with cord
- Diagonal agility with cord
- Functional progression
  - Skating
  - Golfing
  - Running

Rehab Summary
Phase III: Advanced

- No ballistic or forced stretching
- No treadmill use
- No pain with functional progression activities
- No contact activities
- Criteria for progression to phase IV:
  - Pass sport test

Rehab Goals
Phase IV: Sport-Specific Training

- Criteria for full return to competition:
  - Full pain free ROM
  - Ability to perform sport-specific drills at full speed without pain
  - Completion of functional sports test

Correlation of a Functional Exam to Patient Function and Activity Following Hip Arthroscopy

Arthroscopy Association of North America, Annual Meeting 2008
METHODS
• Following hip arthroscopy, 93 patients underwent a standardized functional exam (Sport Test) administered by a physical therapist
• The test is scored based on how well the patient performs 4 separate tasks in designated times
• These tasks include single knee dips, lateral agility tests, and forward and backward running

FUNCTION & ACTIVITY
• Data was also collected to document patient reported pain, function and activity
  – Hip Outcome Score (HOS)
    – ADL component
    – Sport component
  – Modified Harris Hip (MHH)
  – SF-36
    – Physical component
    – Mental component

RESULTS
• Average time between surgery and sport test was 5.9 months
  – Range 1.3 to 17.7 months
• Average patient age was 33.5 years
  – Range 14 to 66 years
• There were 49 women and 44 men
• The average score was 15.5
  – Range: 0-20

RESULTS
• The Sport Test correlated with age (r=-.218; p=0.025) but did not correlate with gender (p=0.069)
• The average MHHS was 85.3 (range: 36.3-100)
• The Sport Test did not correlate with the MHHS
  – Sport Test did correlate with the functional component score of the MHHS (r=.229; p=0.019)
  – Did not correlate with the pain component of the MHHS (r=0.086; p=0.382)
RESULTS

• HOS ADL had a mean score of 89.6 (range: 48.6-100)
  – The Sport Test positively correlated with the HOS ADL ($r=0.249; p=0.01$)

• The HOS Sport had a mean score of 74.9 (range: 0-100)
  – The Sport Test correlated with the Sport Test ($r=0.311; p=0.002$)

RESULTS

• The physical component score (PCS) of the SF-36 had a mean score of 52.1
  – The SF-36 PCS correlated with the Sport Test ($r=0.215; p=0.030$)

• The mental component score (MCS) had a mean of 55.0 (range: 30.4-71.5)
  – The Sport Test did not correlate with the SF-36 MCS ($r=0.053; p=0.596$)

CONCLUSION

• The Sport Test correlated with subjective reports of hip function (HOS Sport, HOS ADL, SF-36 PCS, and MHHS functional component).

• We found that this Sport Test was a valid functional test that correlated with widely accepted and validated functional outcome measures for hip arthroscopy.

Following this study, the general sport test was modified to be more specific for the hip.
**HIP SPORT TEST**

- 20 points total
- 17 points or greater considered passing score
- Patients are allowed to return to full functional training with passing score

**Single Knee Bends with Sport Cord**

- Tests single leg endurance strength
- 1 point is earned for each 30-second increment completed with proper form
- Goal 3 minutes
- Total of 6 points possible

**Lateral Agility with Sport Cord**

- Tests the ability of the leg to accept load and push off in a lateral direction
- 1 point is earned for each 20-second increment completed with proper form
- Goal 100 seconds
- Total of 5 points possible

**Diagonal Lateral Agility with Sport Cord**

- Tests the ability of the leg to accept load and push off in a diagonal direction
- 1 point earned for each 20-second increment completed with proper form
- Goal 100 seconds
- Total of 5 points possible
Forward Box Lunges

- Tests the lower extremity strength and endurance into extension
- 1 point earned for each 30-second interval completed with proper form
- Goal 2 minutes
- Total of 4 points possible

Summary

- Rehabilitation is crucial to successful outcomes following hip arthroscopy
- Function sport test allows specific criteria for return to sport

Outcomes & Return to Sport

Personal Experience

September 2002 to Jan 2009

- > 2000 labral repairs performed
- Technique has evolved
- No complications specifically related to the labral repair technique
- Now most commonly performed in conjunction with treatment of femoroacetabular impingement
Outcomes

• 122 patients with chondrolabral dysfunction underwent hip arthroscopy
• Average age was 40
• Average time from injury to surgery was 34 months


Outcomes

• Mean modified Harris hip score improved from 58 to 84
• Median patient satisfaction was 9 (1 to 10)
• Lower MHHS score was associated increased time from injury to surgery
• Those with a joint space of less than 2.0mm were 39 times (CI 5.5 to 263) more likely to progress to a total hip arthroplasty


Outcomes

• Independent predictors of a better outcome
  – Pre-operative modified HHS
  – Joint space narrowing ≥ 2 mm
  – Repair of labral pathology instead of debridement


FAI in 45 Professional Athletes: Associated Pathologies and Return to Sport Following Arthroscopic Decompression

Results

- Average time to follow-up was 1.6 years (range: 6 months to 5.5 years)
- Forty-two (93%) athletes returned to professional competition
- Thirty-five athletes (78%) remain active in professional sport at 1.6 years.

Conclusion

- There is evidence that intra-articular hip injuries, specifically labral tears associated with FAI, are present in ice skaters
- The education and understanding is important for players, coaches, trainers and physicians
- Early detection and intervention will be the focus of future studies aiding in the prevention of total hip arthroplasties and increasing the career and productivity of the professional athlete

The role of hip arthroscopy in the elite athlete. McCarthy J et al. CORR 2003

- Findings at arthroscopy:
  - 10/10 anterior labral tears
  - 2/10 associated posterior labral tears
  - 2/10 loose bodies
  - 4/10 chondral lesions
  - 1/10 anterior margin fracture
- 10/10 returned to sport at same level with no/minimal pain
- Conclusion: Hip arthroscopy is a safe and reproducible method to diagnose and treat IA hip disorders in elite athletes.