Evaluation and Management of Hip Injuries

Keep Your Edge: Hockey Sports Medicine 2015
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Types of financial relationships and the companies with whom I have relationships are as follows:

A3 Surgical: Consultant; Shareholder
Arthrex: Consultant
Femoroacetabular Impingement: “Pre-Arthritis”

• Concept of femoroacetabular impingement (FAI) as a source of anterosuperior labral and chondral damage has been well described in the literature (Ganz et al.)

• REPRESENTS 50% OF ALL HIP OSTEOARTHRITIS

Ito K, et al.
Cam and Pincer

- Femoral Impingement (Cam - 9%)
- Acetabular Impingement (Pincer - 5%)
- Combined (86%)
- Associate labral injury (?100 %)

Beck et al, JBJS-B, 2005
Is the hip an athletic joint?
## Most Common Sports for High-Level Athletes

### Table 3: Most common sports for high-level athletes

<table>
<thead>
<tr>
<th>Overall</th>
<th>N</th>
<th>Male</th>
<th>N</th>
<th>P-value*</th>
<th>Female</th>
<th>N</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Soccer</strong></td>
<td>55</td>
<td>1. Football</td>
<td>44</td>
<td>&lt;0.0001</td>
<td>1. Soccer</td>
<td>19</td>
<td>0.56</td>
</tr>
<tr>
<td><strong>2. Hockey</strong></td>
<td>46</td>
<td>2. Hockey</td>
<td>39</td>
<td>0.0006</td>
<td>2. Dance</td>
<td>18</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>3. Football</strong></td>
<td>44</td>
<td>3. Soccer</td>
<td>36</td>
<td>0.56</td>
<td>3. Field Hockey</td>
<td>11</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>4. Lacrosse</strong></td>
<td>36</td>
<td>4. Lacrosse</td>
<td>28</td>
<td>0.04</td>
<td>4. Track</td>
<td>10</td>
<td>0.35</td>
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<tr>
<td><strong>5. Track</strong></td>
<td>21</td>
<td>5. Baseball</td>
<td>15</td>
<td>0.007</td>
<td>5. Basketball</td>
<td>8</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6. Lacrosse</td>
<td>8</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*For difference in male vs female participants
Characterization of Symptomatic Hip Impingement in Butterfly Ice Hockey Goalies

Asymptomatic Hip/Groin Pathology Identified on Magnetic Resonance Imaging of Professional Hockey Players: Outcomes and Playing Status at 4 Years’ Follow-Up

Robert A. Gallo, M.D., Matthew L. Silvis, M.D., Brandon Smetana, M.D., Dan Stuck, E.M.T., Scott A. Lynch, M.D., Timothy J. Mosher, M.D., and Kevin P. Black, M.D.
LABRAL TEARS

• Combine these forces with mechanical impingement...
FAI Populations

Non-Athlete

Athlete
FAI Populations

Non-Athlete

“Idiopathic” Osteoarthritis

Athlete
FAI Populations

Non-Athlete

“Idiopathic” Osteoarthritis

Athlete

Hip / Groin Pain & Inability to Play
Athlete

Femoroacetabular Deformity
Athlete

Femoroacetabular Deformity

Decreased ROM
Athlete

Femoroacetabular Deformity

Decreased ROM

Impingement within functional range for sport
Athlete

Femoroacetabular Deformity

Decreased ROM

Impingement within functional range for sport

Labral / Chondral Injury
Athlete

Femoroacetabular Deformity

Decreased ROM

Impingement within functional range for sport

Pain and decreased performance

Labral / Chondral Injury
Athlete

Femoroacetabular Deformity

Pain and decreased performance

Labral / Chondral Injury

Decreased ROM

Impingement within functional range for sport
Athlete

Femoroacetabular Deformity

Inability to Play

Pain and decreased performance

Labral / Chondral Injury

Decreased ROM

Impingement within functional range for sport

Decreased ROM

Inability to Play
Athlete

Inability to Play

Surgery

Improved in vivo Kinematics
Significant improvement in HHS and HOS
73% to 96% return to play
What factors influence the progression and functional limitations?

Femoroacetabular Deformity

Size, location, or morphology of the deformity

Functional motion required for position

Years playing the sport

Acuity of the injury

Inability to Play
Algorithmic Approach to the Painful Hip

- Injury History
- Clinical Exam
- Radiographic / Mechanical Diagnosis

- Intra-articular Damage Pattern
- Extra-articular Injury Pattern
Layered Anatomical Approach to the Hip

Layer 1: Osteochondral Layer
Mechanics of joint

Layer 2: Inert Layer

Layer 3: Dynamic Layer

Layer 4: Neural Layer
Layer 1: Osteochondral Layer

Structures: Femur, Pelvis, Acetabulum
Purpose: Joint congruence and normal osteo / arthro kinematics

1. Dynamic Impingement

2. Static Overload

3. Dynamic Instability

4. Extraarticular Impingement
Dynamic Impingement:
Pre and Post Cam Correction
2. Static Overload

- **Dysplasia**
  - Anterior or Lateral deficiency
- **Excessive Femoral Anteversion**
3. Dynamic Instability

- FAI induced instability

- Posterior hip subluxation => frank dislocation

- Posterior acetab. overcoverage (or prominent ischium) + increased FV

- Anterior hip subluxation
Layer 2: Inert Layer

**Structures:** Labrum, joint capsule, ligamentous complex, ligamentum teres

**Purpose:** Static stability of the joint

- **Labral Injury**
- **Cartilage Injury**
- **Capsular Injury**
  - Instability
  - Adhesive capsulitis
Layer 1 effect on Layer 2

Synovitis
Anterior labral injury
Ligamentum teres avulsion

Posterior bony Bankart lesion
Chondral injury to femoral head, Loose chondral body

Krych et al, CORR 2012
Compensatory Soft Tissue Response: Core Muscle Dysfunction

• Layer 3 – “Pubalgia”

  • Medial Core Muscle Dysfunction
    – Adductor Tendinopathy
    – Rectus Tendinopathy
  • Anterior Core Muscle Dysfunction
    – Hip Flexor Strain
    – Psoas Impingement
    – Sub-Spine Impingement
  • Posterior Core Muscle Dysfunction
    – Proximal Hamstring Syndrome
  • Lateral Core Muscle Dysfunction
    – Peritrochanteric Space Disorders
Compensatory Injury Patterns: Adductor and Rectus Tendinopathy

• Increased stress on the hemi-pelvis from FAI and decreased IR and secondary strain on the central pubic musculature: Medial Core Muscle Dysfunction
High Incidence of Athletic Pubalgia Symptoms in Professional Athletes with Symptomatic Femoroacetabular Impingement
Hammoud S, Bedi A, Magennis E, Meyers WC, Kelly BT

- **Conclusion:** There is a high incidence of symptoms of AP in professional athletes with FAI of the hip. This study draws attention to the overlap of these 2 diagnoses and highlights the importance of exercising caution in diagnosing AP in a patient with FAI.

*Arthroscopy.* 2012 Oct;28(10): 1388-95
Anterior Core Muscle Dysfunction: Psoas Impingement

• **Iliopsoas Complex**
  – Chief flexor of the hip
  – Prevents hyperextension of hip during standing

• **Psoas Major**
  – Origin
    • T12 – L5 (transverse processes)
  – Insertion
    • Lesser trochanter
Psoas Impingement

• Iliopsoas has an intimate association with capsulolabral complex
• Increased femoral anteversion and overload of the psoas against the anterior pelvic rim
Algorithmic Approach to the Painful Hip

Layer 1: Osteochondral Layer
Mechanics of joint

Layer 2: Inert Layer

Layer 3: Dynamic Layer

Layer 4: Neural Layer
Case JK: Hockey Goalie

- 24 y/o male
- Right Hip Pain
- Central Pubic Pain
- Pain playing
- Significant decrease in function
- Difficulty throughout the season
- Significant pain with groin soreness after practice and games
Case JK: Hockie Goalie

• 6’ 1”, 200 lbs
• Pain with flexion, IR, adduction
• ROM:
  – Flexion 0 - 130 degrees
  – IR 10 degrees
  – ER 50 degrees
• No strength deficits
• Pain with resisted abdominal contraction
• Pain to palpation over b/l adductor tendons
CT Scan
Treatment Options

- Physical therapy
- NSAIDs and Injections
- Athletic Pubalgia Surgery / “Sports Hernia”
- Hip Arthroscopy
Intraoperative Findings
1. Access / Visualization

Transition zone injury

Contra-Coup injury
2. Capsule Cut – IA Evaluation

Cam Injury
• Cam delamination
• Loss of normal attachment of labrum to transition zone.

Rim Injury
• Capsular sided injury to the labrum / capsule against the rim lesion
3. Rim Resection

Rim Exposure
- Severe rim inflammation around the rim lesion

Rim Decompression
- Outline the rim lesion prior to decompression
3. Rim Resection

Resect rim in involved region
4. Labral Refixation:
4. Labral Refixation: Restore the Suction seal
Labral Repair under Cam Decompression
Post-Op CT Scan
Pre / Post-Op CT Scan
Outcome

• 4 years post op
• Resolution of hip pain
• Resolution of athletic pubalgia pain
• Played last three seasons without hip pain
• Never had athletic pubalgia surgery
Rehabilitation and Therapeutic Interventions
Hip Differential Diagnosis

• Is the hip the SOURCE of the problem?
• Is the hip the SITE of the problem?
• Is the hip the SOLUTION of the problem?
Kinetic Chain ROM Compensations

Thorax

L/S

HIPS

Thorax

L/S

HIPS
LOSS OF HIP STRENGTH

Trendelenberg: Abductor Dysfunction
Common Non-Operative Injuries

- Adductor Strain
  - Core Muscle dysfunction
- Rectus Femoris / Iliopsoas Strains
- Quad Contusions
- Hip Pointers
- Hamstrings
- Abductor injury
- Apophyseal Avulsions **
- Morel-Lavallée Lesion **

**May require surgery
Acute Soft Tissue Issues
Glute Work
3 Plane Side Plank
Thoracic Extension
TFL Soft Tissue
Layer Relationship
Should we avoid squatting with hip impingement?

- **Limited hip motion**
  - IR
  - Flexion

- **Modified training in functional ranges to avoid injury.**

- **Split squats**

- **Dynamic and functional training progressions**

CAM Lesion (Anterior)
Dynamic Activities
CLINICAL PEARLS

• Functional muscular adjustment period following hip injury
  – Non-operative muscle injury or post-surgery
• Is it protective tone or true muscle tightness
• Transition and Threshold are potential inflammatory elements
• Form and fatigue dictate exercise volume and intensity
• Reps/Sustained Holds/Timed Work Sessions/Speed
• Neuromuscular control of the pelvis is essential
• Groin pulls still occur
• Not everyone with (+) radiology needs surgery
• HIP REHAB IS NOT LINEAR
TAKE HOME MESSAGE

• THINK PROXIMAL
• THINK CORE
• THINK LINK
Thank You