Managing the Athletic Hip

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TRIA Conference
February 6th, 2016

Disclosures

• No disclosures

Overview

• Key factors identified in individuals with hip pain

• Screening and examination strategies for athletes with hip pain

• Treatment strategies and progressions for athletes with hip pain
3 Fair Statements

• Sparse literature investigating the relationship between hip dysfunction and measures of physical strength, movement & performance

• Lack of high level literature examining non-operative management of FAI-associated hip pain

• Post-operative outcomes (success/failure) largely associated with PRO’s (patient reported outcomes) and return to sport data, NOT objective measures of strength & performance

Why We ALL Care...

Pain-free Athlete with FAI

Intervention

Sport/Training Exposure

Painful Athlete with FAI

Treatment Guiding Questions

Question 1:
• What are the physical performance profiles of individuals with hip pain (FAI or other) compared to those without?
Treatment Guiding Questions

**Question 2:**
- Are we ACTUALLY changing anything with our interventions?
  - How are we measuring change?
    - Patient reported (subjective)
    - Clinical measures (objective)

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Treatment Guiding Questions

**Question 3:**
- If we change physical performance variables (in measurable, clinically significant ways), do patients get better? (function, symptoms)
  - Non-operatively?
  - Post-operatively?

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Characteristics of the Painful Hip

*Mosler et al. Which factors differentiate athletes with hip/groin pain from those without? A systematic review with meta-analysis. BJSM 2015*

- Hip/Groin Pain (not specifically FAI)
  - 17 total studies; 10 high quality

*Diamond et al. Physical impairments and activity limitations in people with femoroacetabular impingement: a systematic review. BJSM 2014*

- Symptomatic FAI: Asymptomatic FAI: Controls
  - 16 moderate to high quality studies
Characteristics of the Painful Hip

<table>
<thead>
<tr>
<th>ROM</th>
<th>Muscle Function</th>
<th>Pain, Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mosler</td>
<td>Hip IR, FABER ROM</td>
<td>controls</td>
</tr>
<tr>
<td>Diamond</td>
<td>Hip ROM w/gait (frontal &amp; sagittal plane)</td>
<td>ADD, ABD, ER, Flex strength</td>
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Diamond et al. BJSM 2014

- Response to intervention
  - Conservative:
    - No significant changes in hip ROM after 25-28 month 4-stage tx program in individuals w/radiographic, symptomatic FAI
  - Ill-defined treatment protocol, exercise compliance not tracked
- Post-Arthroscopy Findings
  - Increased max hip IR
  - Improved ROM observed with gait & squatting
  - No change in hip ROM w/stairs
  - Some findings of NO change in ROM post-op

Return to Sport

Casartelli et al. Return to sport after hip surgery for femoroacetabular impingement: a systematic review. BJSM 2014

- 18 case series L4 evidence
- Moderate to high quality
Casartelli et al: Return to Sport

Average 87% Return to sport post-op
82% at same level as prior to symptom onset
Higher rate for professional athletes compared to recreational, college (level of play, resources)
Reduced RTP rates observed on longer term f/u 1-3 years (of those who originally returned in the 1st year/season post-op)

“Diffuse hip OA” at time of surgery interferes with return to sport outcomes

Performance Testing the Hip

Kivlan BR, Martin RL Functional performance testing of the hip in athletes: a systematic review for reliability and validity. USPT 2012

- 74 articles reviewed
- 4 categories:
  - Movement (18), balance (24), hop/jump (26), agility (6)
Kivlan et al. IJSPT 2012

<table>
<thead>
<tr>
<th>Test</th>
<th>Validity, Normative Data</th>
<th>(+) Diagnostic Association (pain)</th>
<th>(+) Association w/ ABD muscle function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Leg Stance</td>
<td>X</td>
<td>G. Med Tendonopathy</td>
<td></td>
</tr>
<tr>
<td>Single Limb Squat</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Deep Squat</td>
<td>X</td>
<td>FAI</td>
<td></td>
</tr>
<tr>
<td>SEBT</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Hop Tests</td>
<td></td>
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</tbody>
</table>

Non-Operative Management


- Single subject case study
  - FAI patient
  - Hip exam and motion analysis

_Austin AB, et al. JOSPT 2008_

- Pt. demonstrated _increased hip IR, ADD & pain_ with:
  - Single leg step down
  - Running
  - Drop Jump

- IR, ADD, and pain reduced in single session with use of SERF strap
Non-Operative Management


- Case series w/4 patients w/confirmed labral pathology
  - Hip exam, strength measures

Yazbek PM, et al. JOSPT 2011

- 3 phase non-operative progression over approx. 12 weeks
  - Improved function
  - Decreased pain
  - Correction of muscular imbalance
  - Increased muscle strength (hip flexors, ABD, extensors)

Yazbek PM, et al. JOSPT 2011

- Phase I:
  - Pain control
  - Basic trunk stabilization
  - Correction of abnormal mvmt patterns
- Phase II:
  - Muscle strengthening
  - Restoration of ROM
  - Sensory motor training
  - Correction of muscular imbalance (LSI% 100%)
- Phase III:
  - Advanced sensory motor training
  - Sport-specific functional progressions
PT Problem Solving

Create your Hypothesis

Confirm your hypothesis

Apply Intervention

Did anything change??

PT Problem Solving

Posture & Movement Screen

Tabletop Exam

Treat what you find

Re-assess:
1) Did you improve any measurable objectives??
2) Do they function or feel better as a result??

Bryan Kelly, MD, HSS “Layer Model”

Layer 4
- "Neurokinetic"
- Lumbosacral plexus, lumbopelvic structures

Layer 3
- "Dynamic"
- Contractile structures
- Dynamic stability

Layer 2
- "Inert"
- Labrum, ligament/Capsular complex

Layer 1
- "Osteochondral"
- Bony structures (true FAI)
Bryan Kelly, MD | HSS Layer Model

- Determine to “driver”/layer of the pathology per a combined appraisal of:
  - Radiographic Findings
  - Basic Clinical Exam
  - Dynamic Mobility, Kinetic Chain Assessment
  - Differential Diagnosis
  - Patient response to intervention (or lack of)

Contralateral Pelvic Collapse

- Hip weakness, activation deficit
- Lateral trunk weakness
- Poor postural stability
- Poor kinematic control, motor strategies

- Quadriceps muscle weakness, dysfunction
- Knee pain = not wanting to flex @ knee in sagittal plane = transfer motion to frontal plane (hip)

- Restricted sagittal plane foot/ankle mobility (DF) = transfer motion to frontal plane (hip)
- Poor proprioceptive control

Contralateral Pelvic Hike

- Adductor, TFL tone/tightness
- Restricted hip mobility
- Hip weakness, activation deficit
- Hip pain
- Lateral trunk weakness
- Poor postural stability
- Poor kinematic control, motor strategies

- Quadriceps muscle weakness, dysfunction?

- Restricted/poor weight acceptance into foot/ankle in frontal plane
- Poor proprioceptive control
Posture & Movement Screen

- Static posture (frontal & sagittal views)
- Dynamic movement (squat, lunge)
- Trunk rotation assessment
- Gait
- Athletic movement screen

Static Posture Observations

Rotational Movement Screen
Dynamic Movement Screening

- This screening should be ONGOING
- Repeat throughout your rehab progressions
- Continue to look at all planes of motion
- Modify treatment per observations

Assess Accessory Mobility: T-spine Rotation
Tabletop Exam

- Palpate
  - Zero in on painful structure
  - Corroborate with other clinical exam findings

- Screen proximal distal joint mobility
  - Foot/ankle, knee, spine

- Strength, Stability:
  - Hip, trunk

- Differential screening prn:
  - Neural
  - Segmental mobility at spine
  - SIJ

Key Treatment Progressions

- Honor symptoms ALWAYS
- Progress Motor Learning & Demand:
  - Load, repetition, complexity & speed
- Normalize functional kinematics
- Address fundamental impairments
- Change the pain/Protect Joint
Manipulate Symptoms

- Activity (temporary) Modification
- Movement Pattern Maximization

Manual interventions at relevant structures:
- Soft tissue work for tone
- Joint mobilizations for pain control (reduce impingement moments)

Address Fundamental Impairments

- Range of Motion
  - Full, pain-free, controlled, well-distributed:
    - Foot/Ankle → Hip → Spine
- Muscular weakness, dysfunction:
  - 360° Hip, Core

Kinetic Chain Mobility Deficits

- Ankle DF
  - Alters sagittal plane kinematics (squatting, stairs, gait)

- Hip ABD, ER
  - Inability to pull out of valgus movement tendency
  - Transfers rotational movement demand to other joints

- Hip ADD, IR
  - Inability to load transfer effectively into the hip for single limb tasks
  - Alters hip functional hip arthrokinematics

- Spine Rotation
  - Transfers rotational movement demand to other joints
Address Fundamental Impairments

Range of Motion
- Full, pain-free, controlled, well-distributed:
  - Foot/Ankle → Hip → Spine

Muscular weakness, dysfunction:
- 360° Hip, Core

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How do we work target muscles?

Distefano et al. JOSPT 2009
- % of max volitional isometric contraction achieved (MVIC)
  - SL hip ABD
    - 81% G. Med
    - 39% G. Max
  - SL hip ER
    - 38-40% G. Med
    - 34-39% G. Max

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Gluteus Maximus Strengthening

Ekstrom et al. JOSPT 2007
(% of MVIC with EMG)
- Quadruped Arm/Leg lift
  - 56% G. Max
- Single Leg Bridge
  - 40% G. Max
**Hip Strength and Core**

Ekstrom et al. 2007  
(% of MVIC with EMG)

- Side Bridge:  
  - 74% G. Med  
  - 21% G. Max  
  - 69% External Oblique

**CKC Glut Max and Glut Med**

Distefano et al. JOSPT 2009  
(% of MVIC with EMG)

- Single limb squat:  
  - 64% G. Med  
  - 59% G. Max

**CKC Strength and Proprioception**

Single Limb Dead Lift:  
59% MVIC at G. Max  
58% MVIC at G. Med  
DiStefano, 2009
Thoughtful Strength Progressions


Recommendations per *Philippon AJSM 2011*

- **Phase I** (First 4-8 weeks):
  - Prone resisted TKE
  - Prone HS curl
  - 2 leg bridge

- **Phase II** (Next 4 weeks):
  - Resisted hip extension
  - Stool hip IR
  - SL Hip ABD wall slides
Recommendations per Philippon AJSM 2011

- Phase III (Next 4 weeks):
  - Prone heel squeeze
  - SL Hip ABD w/femoral IR
  - Single leg bridging

Key Treatment Progressions

- Honor symptoms ALWAYS
- Progress Motor Learning & Demand: Load, repetition, complexity & speed
- Normalize functional kinematics
- Address fundamental impairments
- Change the pain/Protect Joint
Athletic Treatment Progressions

**Mobility**
- Get full, pain-free ROM
- Keep full, pain-free ROM
- Use full, pain-free ROM OKC→CKC

**Strength, Power, Endurance**
- Establish OKC base
- Progress OKC & CKC
- Increase Load
- Increase Speed
- Increase Reps

**Motor Complexity**
- Unisegmental→Multi-segmental
- Uniplanar→Multi-planar
- Planned→Reactive

Triple Flexion<>Triple Extension

Excursion
Multi-Planar, Multi-Segment, Rotational Control

Sport-Specific Movements & Postures

Athletics
Athletic Progressions

Reproduce athletic challenges with therapy progressions

Key Treatment Progressions

- Motor Learning Progressions & Demand: Load, repetition, complexity & speed
- Normalize functional kinematics
- Address fundamental impairments
- Change the pain/Protect Joint

My hip still hurts...

- When?
  - During which motions, postures?
  - For how long?
- Where/What?
  - Anterior hip region: HF imbalance with rectus femoris, anterior hip capsule hanging postures
  - Lateral hip: G. Med overload (too short, too long), imbalance in hip mm. actions (ABD<>ADD balance?)
  - Groin: Lack of motion into ADO/IR still? (joint mobilizations, AOD-STM)
- How?
  - Sharp pinch, aching, tightness??
    - Allows you to suspect the correct layer of involvement per symptom nature
PT Problem Solving

Posture & Movement Screen
Tabletop Exam
Treat what you find

Re-assess:
1) Did you improve any measurable objectives??
2) Do they function or feel better as a result??

In Summary...

• We do not yet fully understand the physical performance profiles of individuals with hip pain, FAI or not
  – Strength, movement patterns, etc.

• We have very preliminary evidence of the effectiveness of PT interventions for managing pain & returning athletes to play
  – More post-operative than non-operative evidence

• Effective examination & treatment of the hip require good working knowledge of the entire kinetic chain

References

References