FAI: Non-surgical Approach

Chris Howson DC
Altru Health System
Objectives

1. Provide a definition of the types of FAI.
2. Identify modifiable factors that can influence FAI symptoms.
3. Provide manual strategies to address FAI.
4. Provide rehab strategies to support and reinforce manual intervention.
Definition of FAI

FAI (Femoroacetabular Impingement) - “abnormal anatomic relationships within the hip joint that may lead to articular damage...caused by bony deformities or spatial malorientation of femoral head-neck junction and/or the acetabulum." (italics mine)
Typical Presentation

- Often gradual onset of groin pain or buttock pain and loss of terminal hip ROM.¹
- Pain w Rotation (73.6%), groin-pain (65.2%)²
- Gait may be normal or antalgic limp
- Exam findings of decreased hip ROM, especially in internal rotation or adduction in a flexed position.¹
- FADIR (anterior impingement sign)
Radiographic findings

• AP Pelvis view
• Asphericity of femoral head - “Cam Lesion”
• Acetabular overcoverage - “Pincer Lesion”
• Mixed - Characteristics of both types.
Cam Lesion
Cam Lesion

- Most common type - 50%\(^5\)
- Young males
- Siebenbock et al report more common in aggressive athletes playing baseball and ice hockey.\(^4\) 15x more likely in youth hockey players than age matched youths.\(^3\)
- Ages 12-16 most common, high forces acting on immature bone?\(^3\)
Pincer Lesion
Pincer Lesion

- Least common type - 2%\(^5\)
- Typically found in middle-aged females
- “Functionally excessive acetabulum that is too deep or maloriented.”
- Cross-over sign
- The more caudal the cross-over, the more severely retroverted.\(^1\)
Mixed-type FAI

- 2nd most common type - 48% \(^5\)
- Both Cam and Pincer are present
Modifiable Factors in FAI

• Is there such a thing as conservative treatment for FAI?
• A better term is conservative management.
• Journal of Science and Medicine in Sport 2016 - “current literature reports and estimated 23% to 67% prevalence rate of FAI in the general population.”

• *Arthroscopy* - 2015 - main indications for surgery = imaging-confirmed FAI, pain and decreased function not resolved with conservative care (cited in 7)
Modifiable factors in FAI

• So even in the presence of bony abnormality, if we can eliminate pain and restore function we essentially fix the problem.⁹ What factors are involved?
  – Pelvic tilt
  – Femoral rotation
  – Hip joint position / mobility
  – Foot mechanics
  – Muscle activation and firing sequence
  – Whole lower chain (SI, L/spine, knees, etc) bilaterally
Pelvic Tilt and Femoral Rotation

- Coupled motion between pelvis and hip
- Every 5° tilt = 1.2-1.6° rotation of femur
- FADIR test - Flexion, Adduction, Internal Rotation.
- Anterior pelvic tilt = Flexion and Internal Rotation
- 10° change in tilt = 5-9° change in rotational ROM
- Crossover sign present in 48% of people; 86% in anterior tilt; 14% in posterior tilt.
Pelvic Tilt and Femoral Rotation

• “Lower crossed syndrome” - Janda
• Short, tightened hip flexors and lumbar extensors w/ lengthened and weak abdominals and hip extensors.
• “If the [pt]...works at a desk job and sits all day, this posturing tends to create tightness in the hip flexors which can add to impingement symptoms.”
• Americans sit for an average of 13 hours per day.
Pelvic Tilt and Femoral Rotation

- Studies of hockey players versus other athletes suggest that end range internal rotation may be the biggest problem that causes FAI to become symptomatic.\(^{20}\)
- Stopping or decelerating during skating is the biggest problem movement.\(^{20}\)
Hip position / mobility

• Decreased posterior glide of the femur causes impingement during hip flexion.\textsuperscript{11}
• This results in femoral anterior glide syndrome.
Foot Mechanics

• Subtalar pronation has been linked to excessive lumbar lordosis d/t increased pelvic tilt.\textsuperscript{14}
• Experimentally, inducing calcaneal eversion of 5\textdegree\textsuperscript{-}10\textdegree \ bilaterally or unilaterally caused anterior pelvic tilt to increase by 1.51\textdegree\textsuperscript{12}
• A 2\textdegree\textsuperscript{-}3\textdegree \ increase in pelvic tilt is 20-30\% in standing tilt, caused 50-75\% in walking.\textsuperscript{13}
• Calcaneal eversion caused significant increase in hip flexion angle, hip adduction angle, as well as hip medial rotation angle.\textsuperscript{15}
Muscle Firing Sequence / Balance

- Hip extension sequence is critical to stability in the hip joint.
- If pt is hamstring dominant in hip extension, the leverage involved causes anterior shift of the femoral head.\textsuperscript{11}
- Prologed sitting contributes to the inhibition of the hip extensors and facilitation of hip flexors for stability.\textsuperscript{10}
Muscle Firing Sequence / Balance

• When gluteus maximus is not engaging the gluteus medius will be recruited to help extend the hip. \(^{16, 17}\)

• Gluteus medius is oriented to abduct the hip and is a phasic muscle, this use doesn’t allow it to relax, so abduction is shunted to the TFL. \(^{16, 17}\)

• TFL dominance leads to internal rotation. \(^{11}\)
Whole Lower Chain

- Foot and ankle position
- Knee alignment
- Hip alignment and glide
- SI joints - gluteus maximus and quadriceps inhibition on side of pelvic obliquity\textsuperscript{19, 20} 
- Pubic joint - decreased hip rotation leads to increased pubic symphysis motion, may predispose to athletic pubalgia\textsuperscript{18} 
- Lumbar spine - anterior shift of lower lumbar with pelvic tilt, hip flexor tightness
Manual Interventions to Influence These Factors

- Assess and correct hip joint, SI joints, pubic joint, lumbar spine, ankles, knees.
- Assess and address decreased posterior glide of hip.
Manual Interventions to Influence These Factors

- Soft tissue release
  - Hip flexors
  - TFL
  - Hip rotators, especially deep externals
  - Hip abductors
- Use whatever is available to you, Graston, ASTYM, Dry-Needling, ART, Muscle energy, positional release, strain-counterstrain, etc.
- When patient leaves, motion should be improved, FADIR should be changed. Often I see that while it is still uncomfortable, it is no longer sharply painful.
Rehab / Home strategies for FAI

- Hip extension patterning to establish glute dominance and initiation
- Posterior hip capsule stretching / mobilization
- Banded stretching to open up hips (capsule stretch, quadruped rock backs)
- Foam roller / lacrosse ball on TFL, glutes, hams
- Arch support if subtalar pronation is a factor
- SIT LESS
- For every 30 minutes of sitting, move around for $2^{10}$
- “Bracing sequence”
- Hockey players, dancers, golfers, martial artists all should do this proactively, as prevalence is high.
Bracing Sequence

Step 1: Squeeze your butt as hard as you can. Contracting the glutes places the pelvis in a neutral position. With your feet straight, you should feel a lot of torque through the legs, like you’re screwing your feet into the ground.

Step 2: Pull your ribcage down. Think about the water-filled bucket analogy.

Step 3: Get your belly tight. This locks in the neutral position of the pelvis and the ribcage. You do this by contracting your abdominal muscles, giving it about 20% of tension.

Step 4: Set your head in a neutral position and screw your shoulders back and down. This addresses the top half of the central nervous system. Tuck your chin back, don’t let it stick out forward. Correct the neck and get the shoulders in a good position.

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Avoidance of impingement positions

• Symptomatic patients should avoid running on an incline, recumbant biking (or road biking in extreme trunk flexion), as these can increase FAI symptoms
• Consider sleeping postures
Closing thoughts...

- FAI is an interesting problem, since it is so common but usually asymptomatic.
- Surgical recommendations depend on decreased function and persistent pain.
- The golden rule of care has always been “Conservative First,” which is absolutely critical in this case.
- Even if surgery is performed, studies show that normal movement is not restored in extremes, such as climbing stairs.
References

16. Neumann D. Kinesiology of the hip: a focus on muscular actions. Journal of orthopedic and sports physical therapy 2010; 40(2); 82-94.
References