Biomechanics in FAI Syndrome and Considerations for Rehabilitation

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Overview

- What is FAI syndrome
- What at the biomechanical implications of FAI syndrome
- Clinical implications and considerations for rehabilitation

What is FAI Syndrome?

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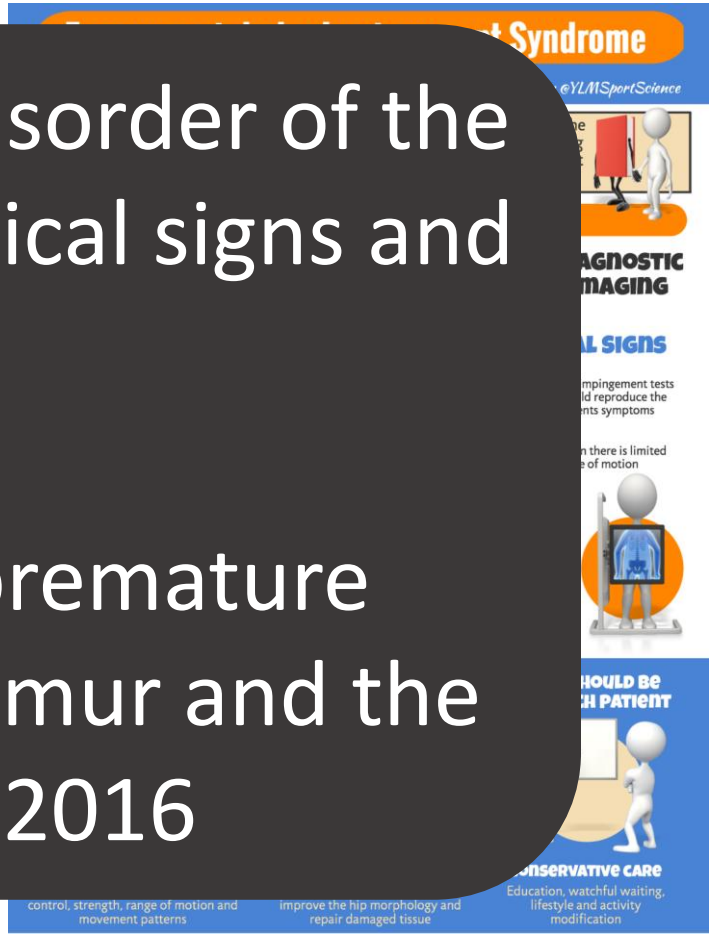
D R Griffi
J C Clohis
A Kassarji
M P Reim

"FAI is a motion-related clinical disorder of the hip with a triad of symptoms, clinical signs and imaging findings.

It represents a symptomatic premature contact between the proximal femur and the acetabulum" Griffin et al 2016



What is FAI Syndrome?

Imaging findings alone ≠ FAI

- Cam morphology: prevalent in 60%-90% of athletic populations[2-5]
- Why do some develop FAI and others not?
- Since FAI is a movement related condition
  - Do biomechanical impairments play a role in symptom development

2. Johnson et al 2012
3. Agricola et al 2012
4. Siebenrock et al 2011
5. Lahner et al 2014

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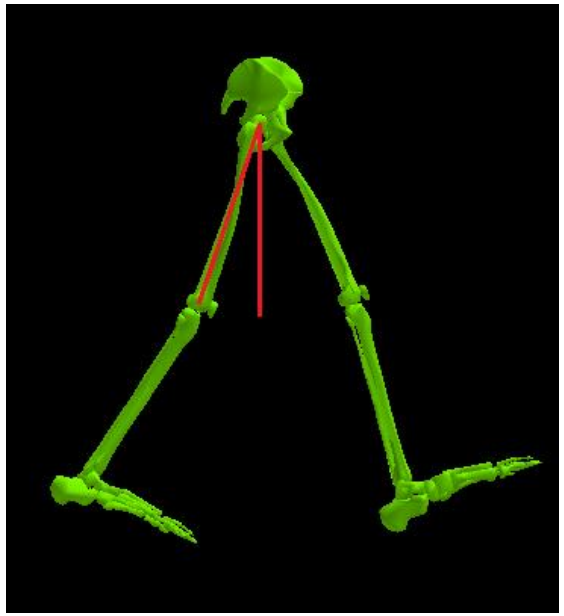
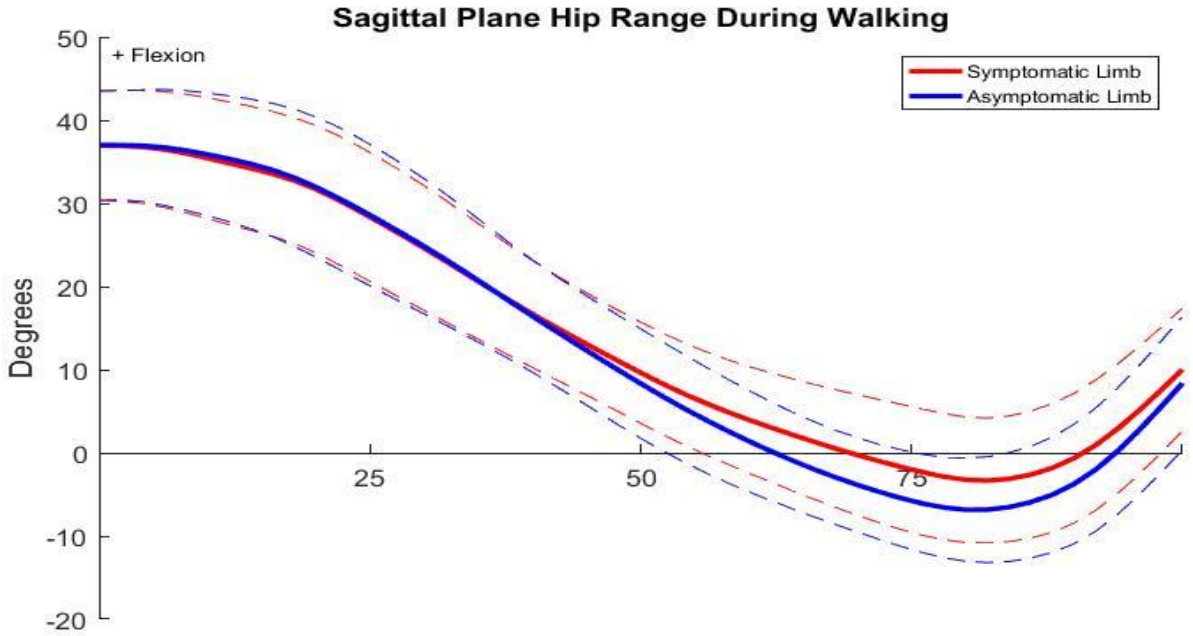
What are the biomechanical implications of FAI syndrome and how should can you consider them in your rehab?

Biomechanical Implications

Walking: Sagittal Plane





FAI vs. Controls
Smaller peak hip extension angle
(SMD -0.40, 95% CI -0.71 to -0.09)

(King et al, 2018)

Unilateral Hip-related Groin Pain vs Contralateral Asymptomatic Limb
Smaller peak hip extension angle
(MD 2.63°, 95% CI 0.75° to 4.55°)

(King et al, 2018 in press)

Biomechanical Implications

Walking: Sagittal Plane

- Lower peak hip extension during stance phase of walking
- Consistent with a variety of hip conditions
  - FAI, [1,2,3] Early OA,[4] Late OA,[5] THR[6]

- Reduce anterior hip joint contact force[7]

- Increase fatty infiltrate[8]
- Decrease hip stability over time[9,10]

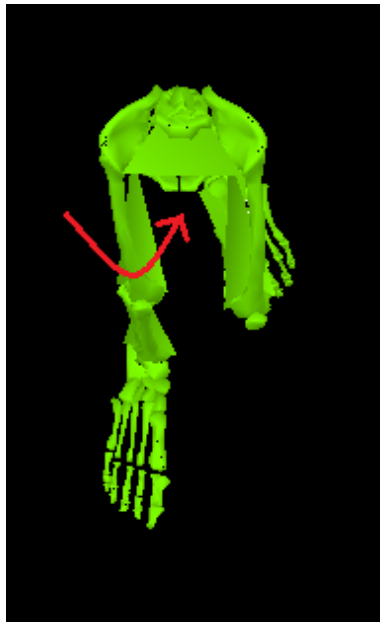
?

- Is this a part of the puzzle?

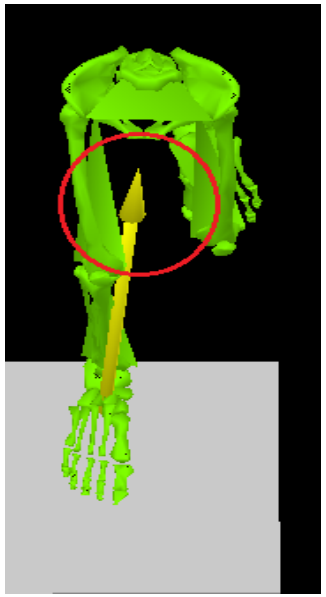
1. (King et al. 2018)
2. (Hunt et al. 2013)
3. (King et al, under review)
4. (Watelain et al. 2001)
5. (Constantinou et al. 2017)
6. (Beaulieu et al. 2010)
7. (Lewis et al. 2010)
8. (Zacharis et al. 2016)
9. (Semciw et al. 2013)
10. (Semciw et al. 2014)

Biomechanical Implications (King et al, 2018)

Walking: Transverse Plane



FAI vs controls
Smaller peak hip internal rotation angle
(-0.67, -1.19 to -0.16)

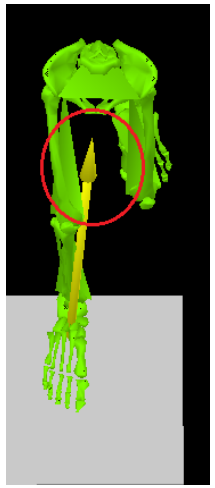


FAI vs Controls
Smaller peak hip external rotation torque
(-0.71, -1.07 to -0.35)

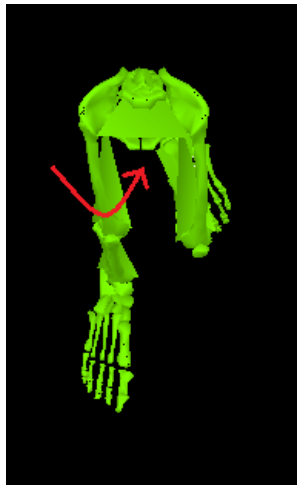
Biomechanical Implications

Walking: Transverse Plane

- Internal rotation is often reported as painful
- Results



Smaller peak hip external rotation torque



Smaller peak hip internal rotation angle

- May be strategies to avoid a painful position

(King et al, 2018)

Biomechanical Implications

Squatting

- People with FAI:
  - Unable to squat as deep as controls

Study or Subgroup	FAI Mean	FAI SD	FAI Total	Control Mean	Control SD	Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
Bagwell et al, 2016	70	18	15	51	14	15	35.0%	1.15 [0.37, 1.93]
Lamontagne et al, 2009	41.5	12.5	15	32.3	6.8	11	31.9%	0.85 [0.03, 1.67]
Ng et al, 2015	44	10	12	37	8	14	33.1%	0.76 [-0.05, 1.56]
Total (95% CI)			**42**			**40**	**100.0%**	**0.92 [0.46, 1.38]**

Heterogeneity: Tau² = 0.00; Chi² = 0.51, df = 2 (P = 0.77); I² = 0%
Test for overall effect: Z = 3.91 (P < 0.0001)

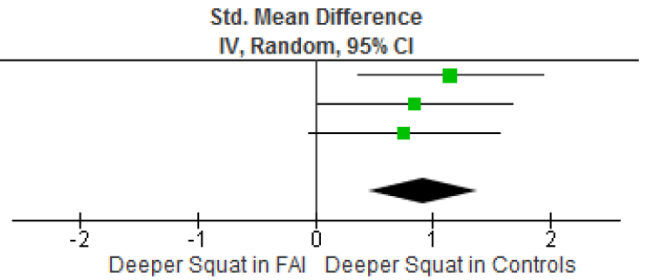


Figure 3 Meta-analysis of squat depth, FAI vs Controls

  - No difference in hip flexion ROM
- WHY?
  - Is it poor motor programming or a fear avoidance behaviour

(King et al, 2018)

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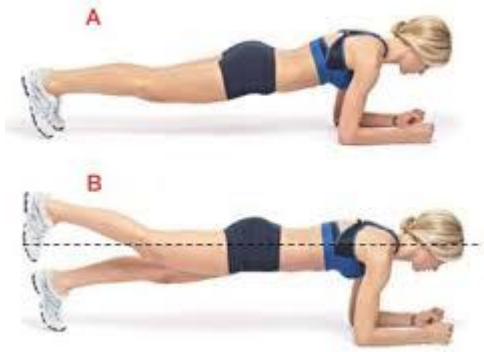
What is going influence your clinical practice?

Clinical Implications

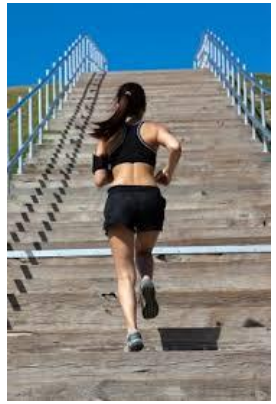
Different ways to regain hip extension, food for thought

Low Level

Moderate Level



High Level



Are gait retraining principals a viable treatment option?

Clinical Implications

Gait retraining principals has been show to a viable treatment option in a variety of presentations.

- Patellofemoral pain
- Knee OA
- Lower lib stress fractures
- Redistribution of load
- Neurological conditions such as
  - Stroke
  - ABI
  - Parkinson's disease

Clinical Implications

Currently no evidence for gait retraining in FAI syndrome

No evidence of effect

≠

Evidence of no effect

- We need to use what we know about the research into other joints to guide our decision making process in the hip

Clinical Implications

Potential gait retaining principals that may benefit FAI syndrome patients

Increasing cadence by 10%

Instructing people to "Push off more with their foot"

- Currently being piloted in FAI syndrome and hip-related groin pain

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Thankyou and Questions?

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All kinds of clever

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