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Athletic Groin Pain : A Biomechanical Diagnosis

Brendan Marshall PhD

Introduction

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Chronic groin pain is prevalant in football
(Werner et al. 2009; Hawkins et al. 1999)

Rapid change-of-direction/cutting associated with groin injury
(Holmich et al. 2014)

~723 cutting actions per game
(Bloomfield et al. 2007)

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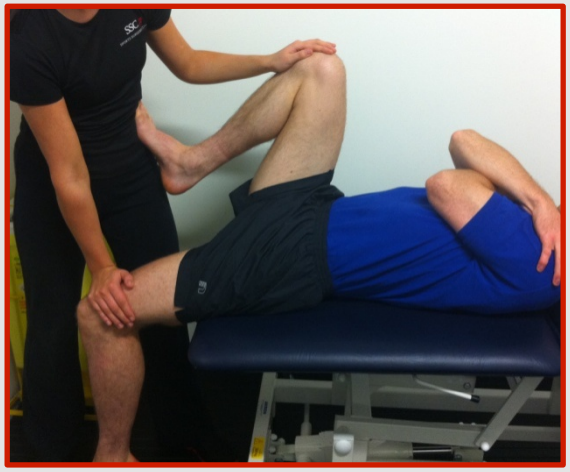
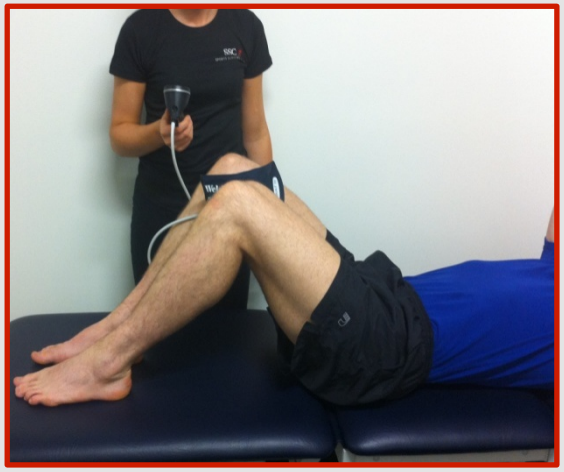
Traditional groin pain assesment:





Lack of Sports Specificity

J Strength Cond Res. 2014 Oct;28(10):2845-51. doi: 10.1519/JSC.0000000000000463.

Biomechanical factors associated with time to complete a change of direction cutting maneuver.

Marshall BM[1], Franklyn-Miller AD, King EA, Moran KA, Strike SC, Falvey EC.

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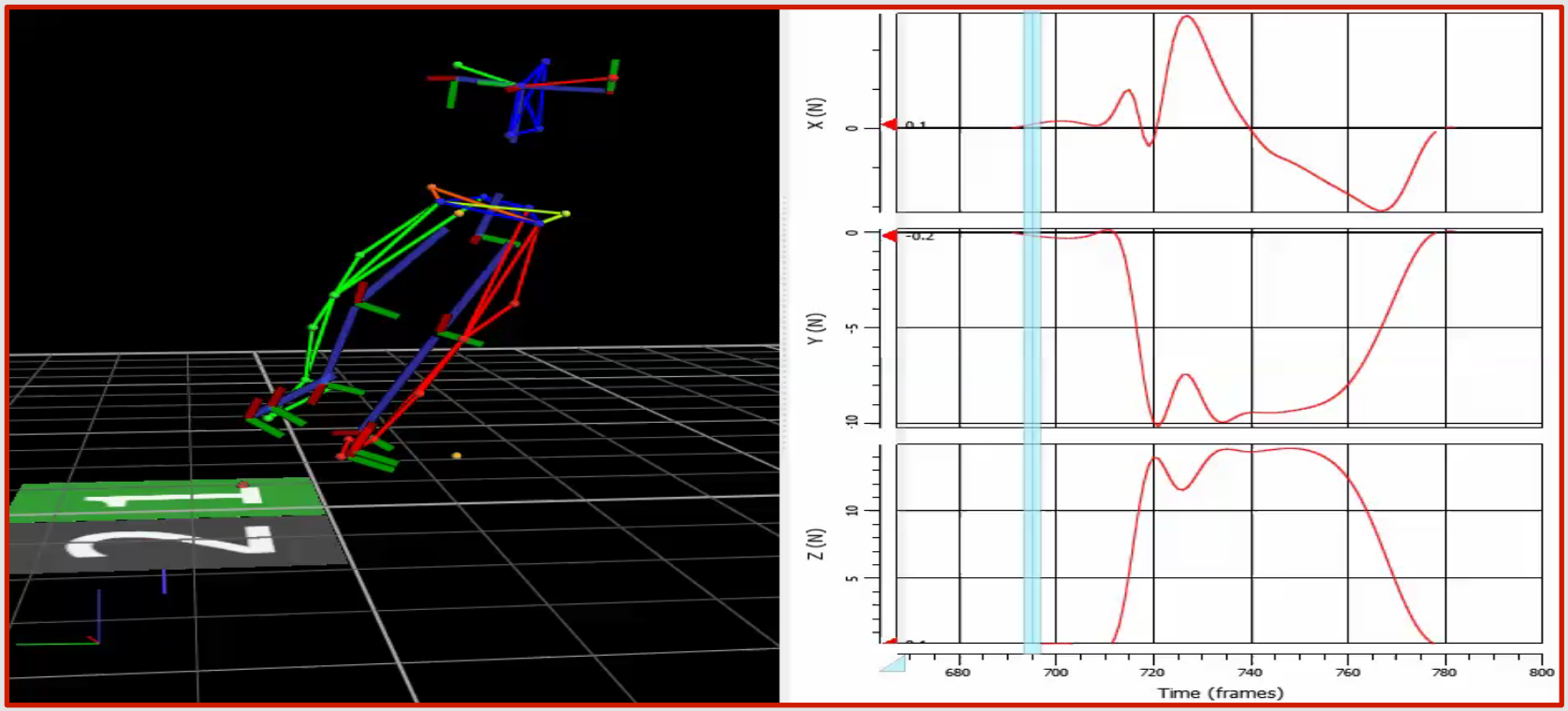

No studies have examined the biomechanics of change of direction cutting in groin pain patients

Cluster Analysis

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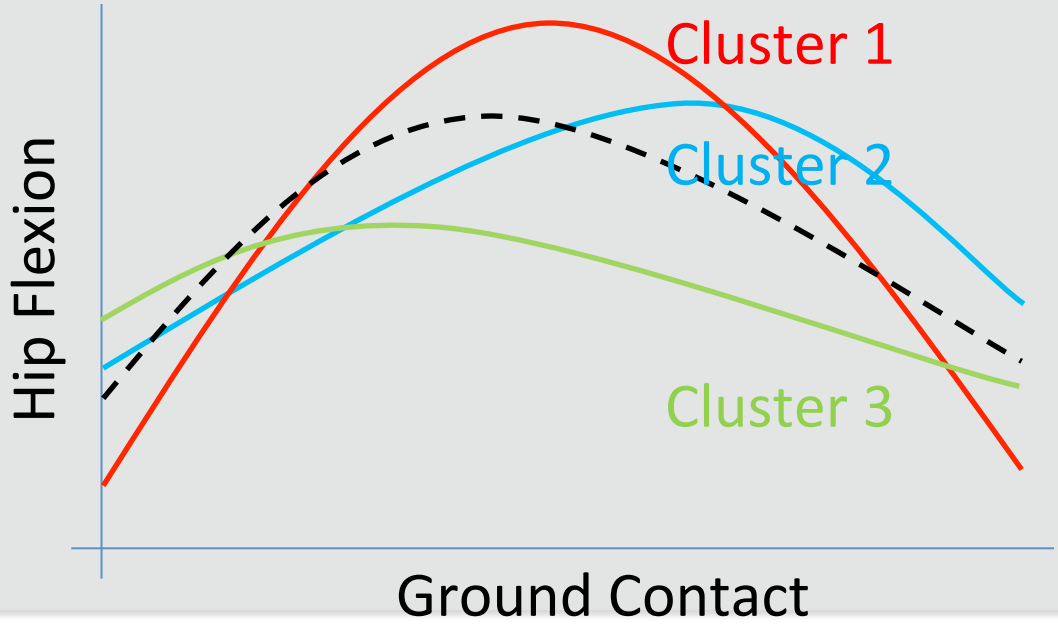
Movement patterns in groin patients are likely to exhibit inter-individual variability, due to:

- Source and severity of the pathology
- Training history
- Neuromuscular capacity
- Anthropometrics



Study Aim

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Apply statistical clustering procedures to identify distinctive features in the cutting mechanics of groin pain patients

Methods

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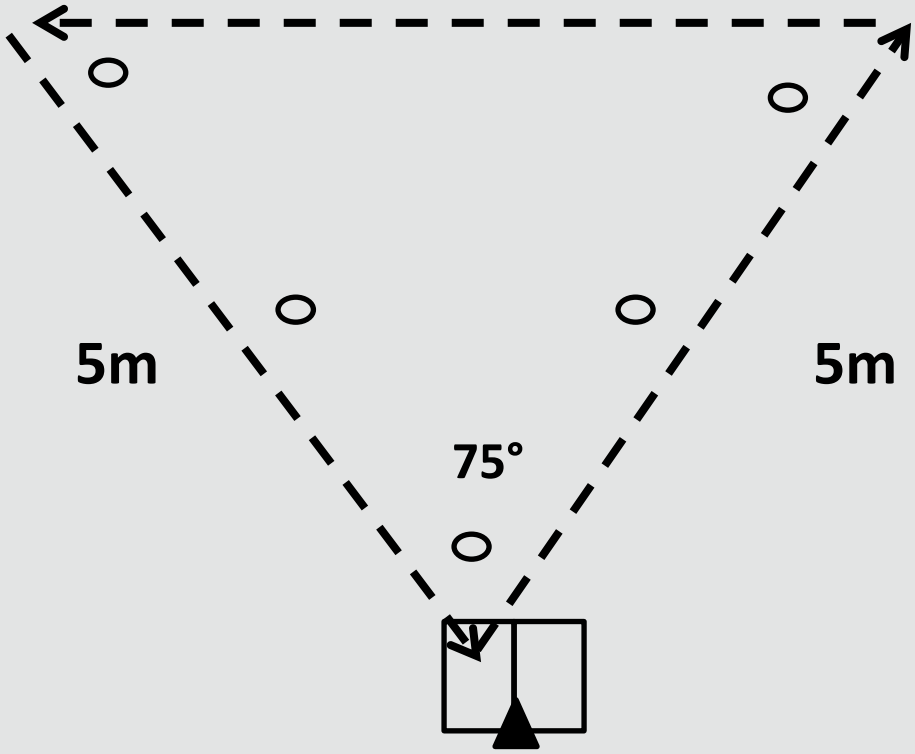
382 field sport athletes diagnosed with AGP

- 3 trials
- Symptomatic side examined
- Vicon motion capture

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3d Biomechanics Assessment Laboratory
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Statistical Methods

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- Hierarchical cluster on kinematic data
- Independent measures ANOVA
- $P < 0.05$

Results

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3 distinct subgroups were created

C1 (40% of participants); C2 (45%), C3 (15%);

Movement Plane	Variable
Sagital	Hip flexion
	Knee flexion
	Trunk flexion
Transverse	Pelvis external rotation
	Trunk external rotation
	Hip internal rotation
Frontal	Ipsilateral trunk side flexion
	Contralateral pelvis dro
	Hip abduction angle

Results

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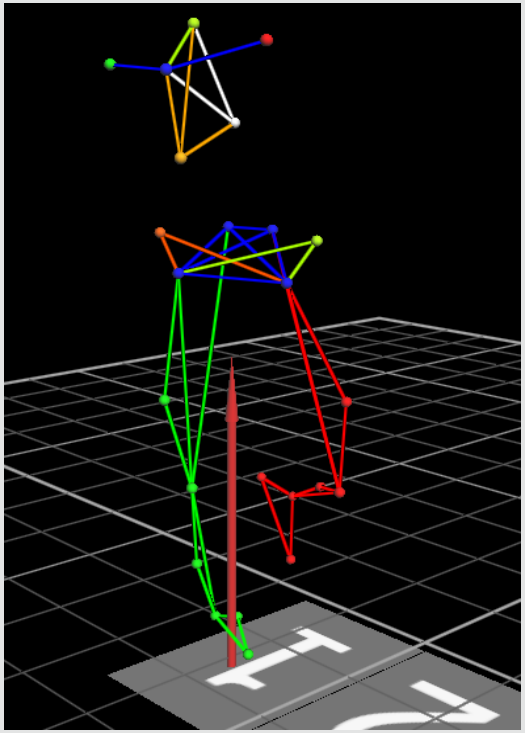
Cluster 1 (40%)



Trunk external rotation
Hip internal rotation
Hip flexion

Discussion

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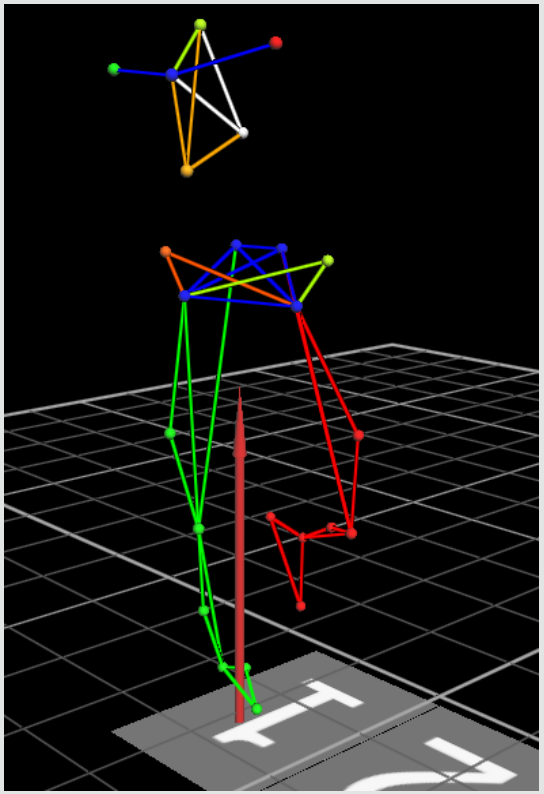
Cluster 1



↑ Hip internal rotation, hip flexion

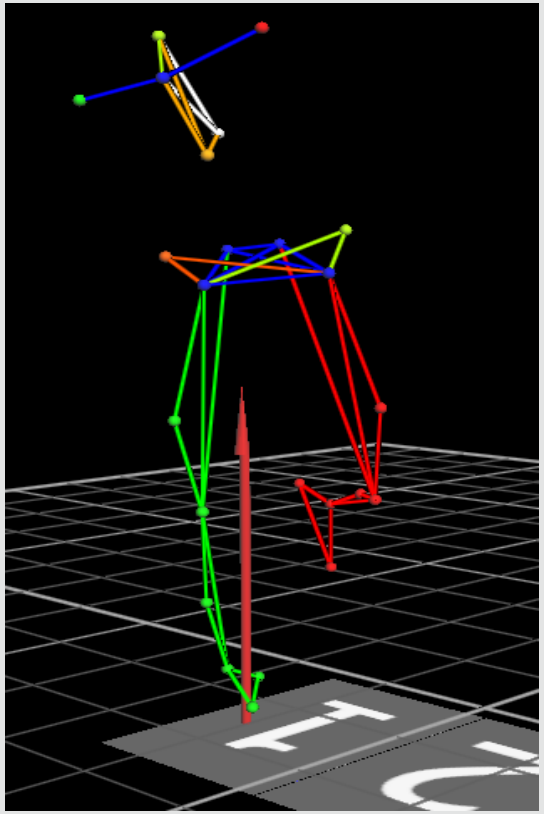
- associated with an increase in pubic symphyseal motion (Birmingham et al 2012)
- associated with femeroacetabular impingement particularly in the presence of abnormal hip morphology

↑ Trunk external rotation

- Likely to have an effect on the hip and groin region

Trunk Vs. Hip: $r = 0.74$, $p < 0.01$

Cluster 2



↑ Hip abduction and trunk side flexion

- Dynamic hip abduction controlled by eccentric action of the adductors
- Greater hip abduction angles appear to be exacerbated by increased trunk side flexion

Hip Vs. Trunk: $r = 0.70$, $p < 0.01$

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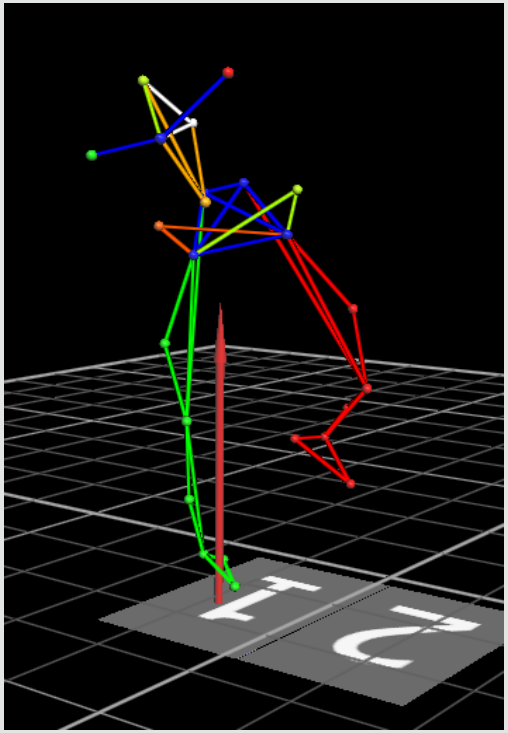
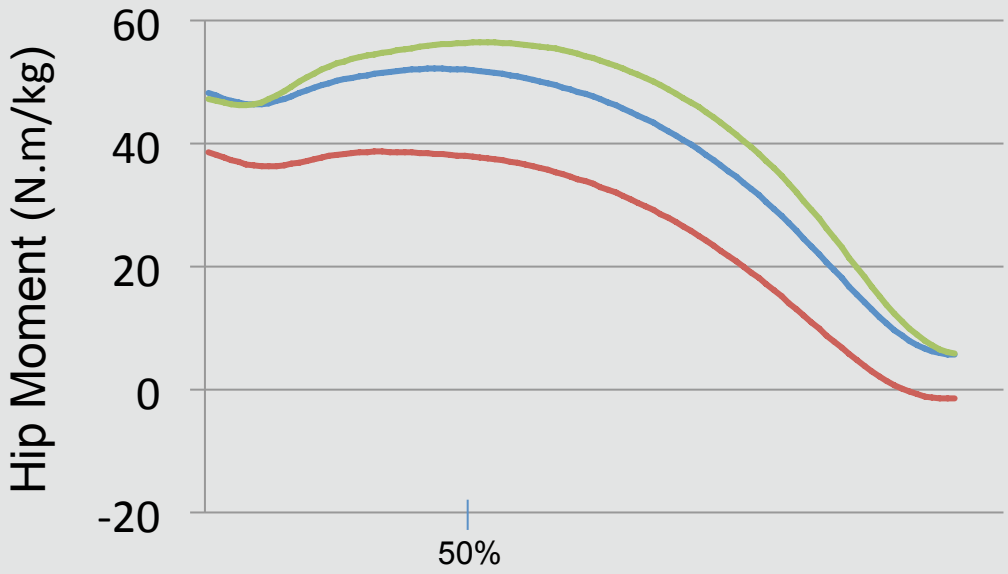
Cluster 3



↑ Trunk flexion, as well as

↑ Hip abduction and trunk side flexion

Due to a reduced posterior chain utilisation/ capacity?



Conclusion

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- 3 distinct movement patterns identified – biomechanical diagnoses
- 3D assessment provides additional information to tailor rehabilitation – **Groin Rehab Workshop, Pickwick Suite, 2.30pm**
- Poor trunk control effects hip and groin mechanics in dynamic movements
- Clustering analysis warranted

Future Work

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Clinical relevance of the clusters

- prospective study in at risk groups (e.g. elite football players)
- rehabilitation RCT

Clustering with kinematic data only

- our classifications could potentially be identified in typical sports medicine practises with 2D cameras
- possible to accurately cluster groin patients based on two dimensional video?

Acknowledgements

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