

Effect of fatigue on scapula kinematics during throwing in handball

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Introduction

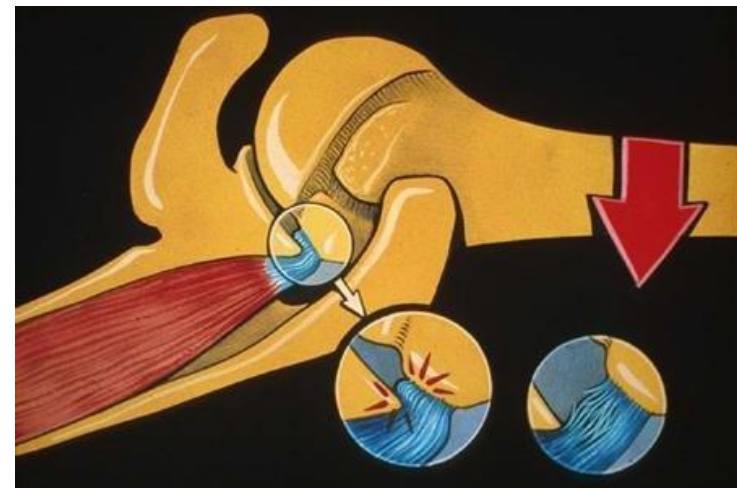
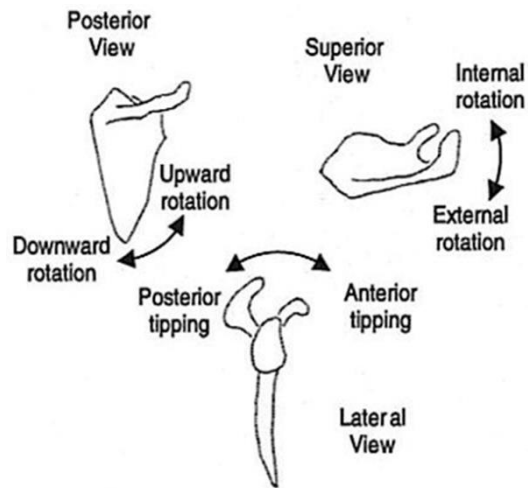
- Handball is an intense sport, with many throws during match or practise.
- 75 % of male handball players reported shoulder pain related to throwing.
- 21 % changed level of activity due to pain.

Clarsen, et al., 2014



Introduction

- The probably most loaded instant of the shoulder during throwing is during the cocking phase with the humerus in abduction and maximal horizontal extension combined with external rotation.
- Lack of scapula posterior tilting, external rotation and upward rotation may increase risk of impingement. (Kibler et al, 1998; Braun et al, 2009)



Introduction

- A few studies have investigated the effect of locally induced fatigue on static positioning of scapula or arm elevation (Tsai, 2003; Ebaugh, 2006; Maenhout, 2015)
- No studies have investigated effect of functionally induced fatigue on scapula kinematics during throwing.
- **The purpose** of the study was to compare the kinematics of scapula during throwing before and after a functional fatiguing protocol.



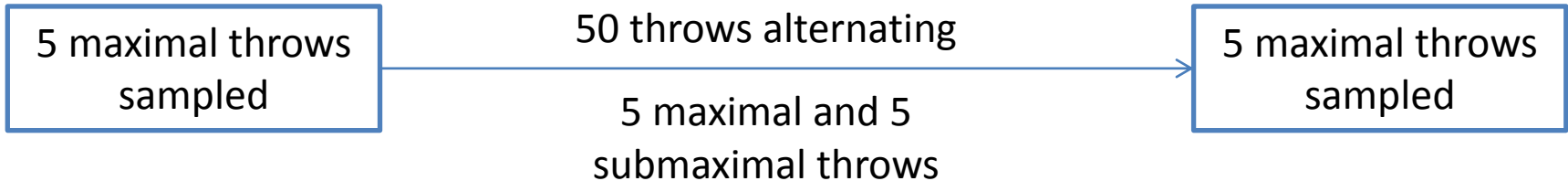
Methods



- Eight adult male handball players volunteered to participate.
- A marker-based biomechanical model was used to measure 3D kinematics of humerus and scapula in relation to thorax during throwing. (Wu et al, 2005)
- Data from 5 maximal throws was collected before and after a fatiguing protocol



Fatiguing protocol

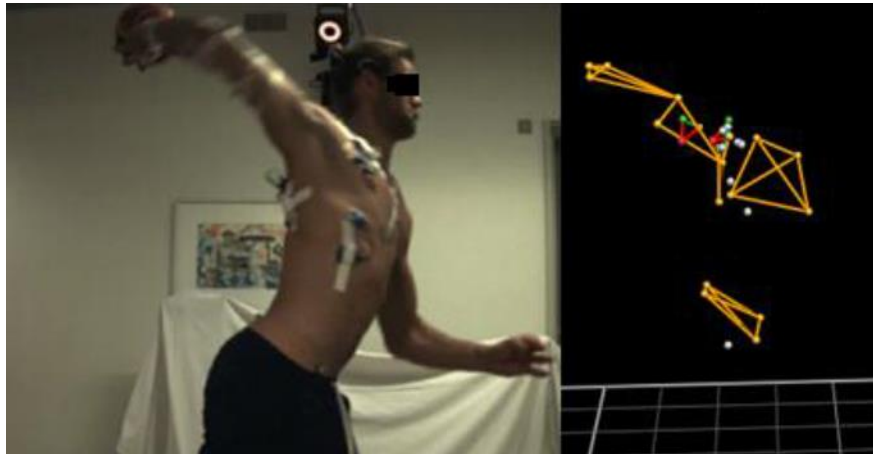


- Throw velocity was measured, and submaximal equalled 80 % of maximal
- Level of fatigue was registered used a 10-point Borg-scale before and after fatigue.



Outcome parameters

- Scapula anterior tilt and upward rotation at the instant of maximal humeral external rotation was used as outcome parameters.
- All data were tested for normality and a paired t-test was used to examine differences pre to post fatigue.

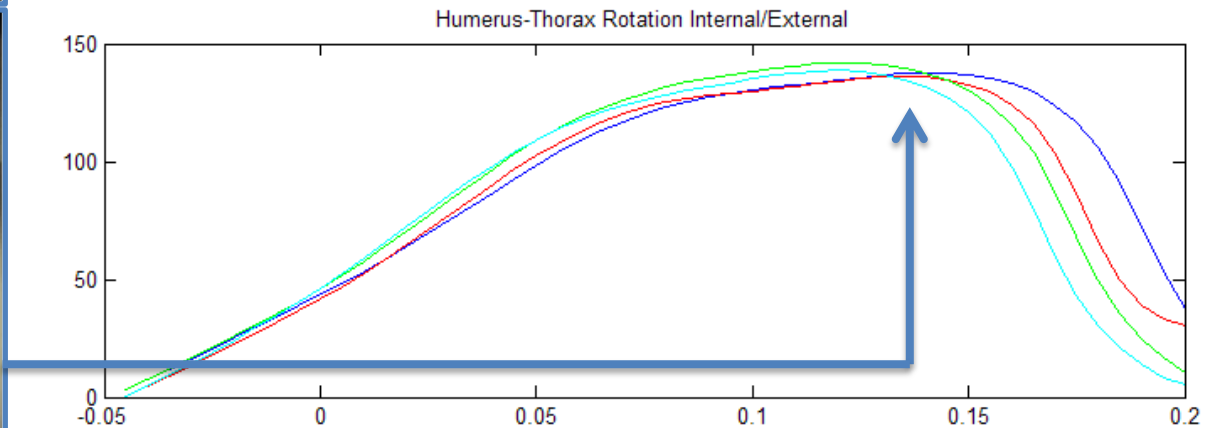
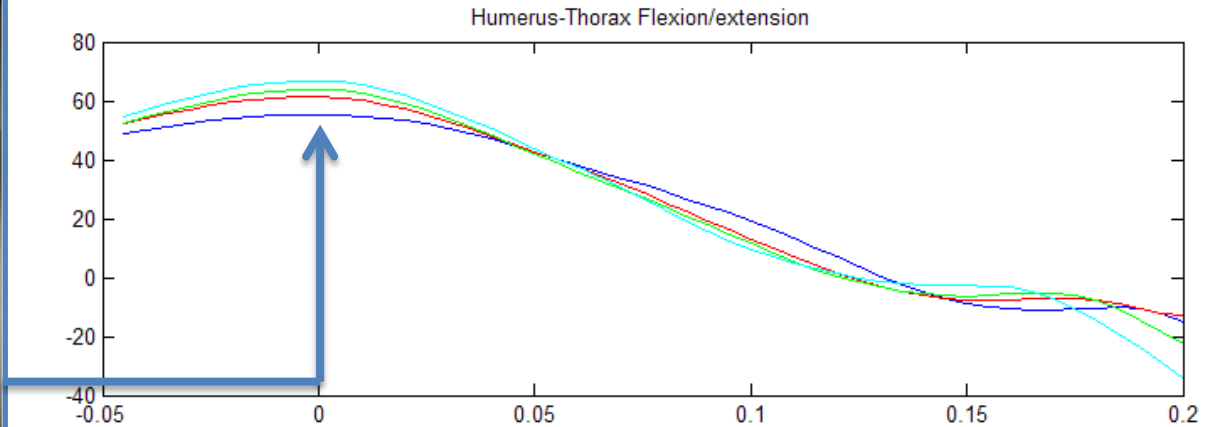


Results: Fatigue

- On average, self-rated fatigue increased from 1.5 (SD:1.2) to 6.1 (SD:2.1) ($p < 0.001$) during the fatiguing protocol.

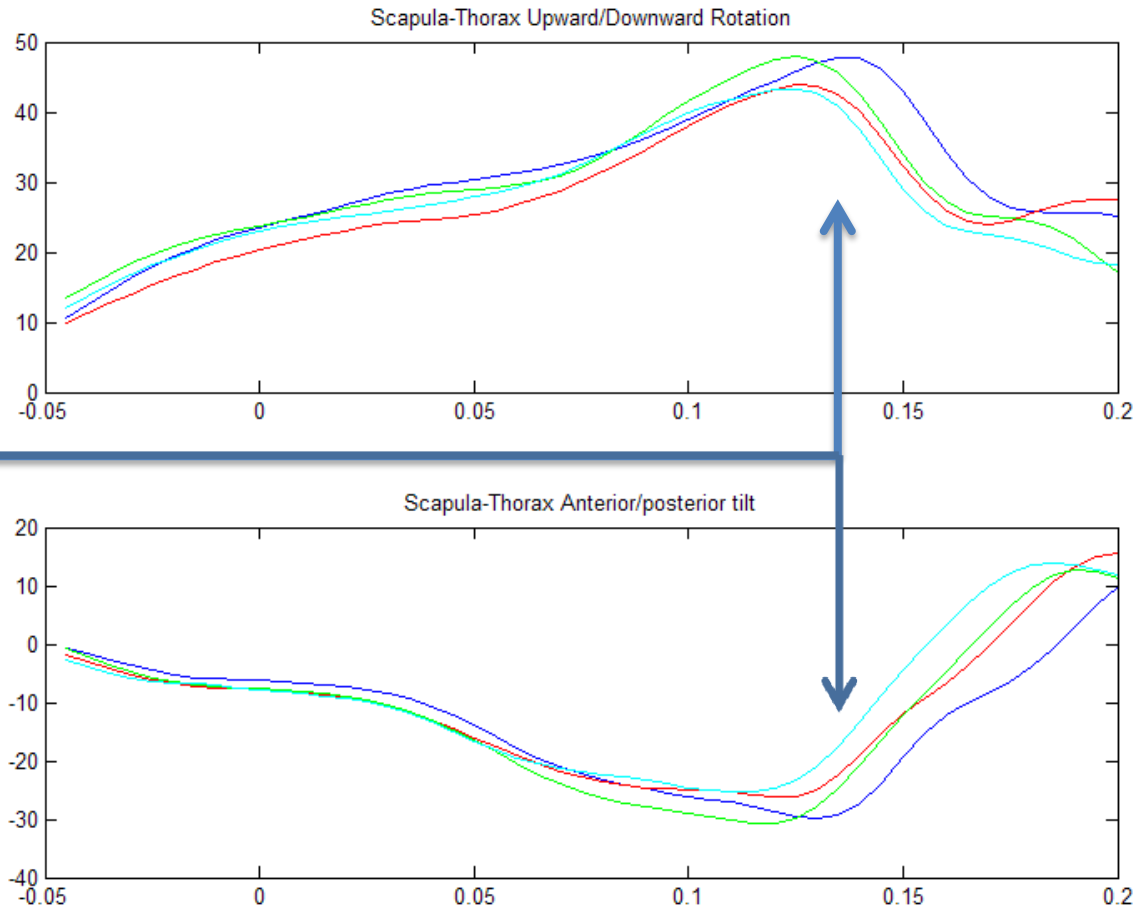


Results



Results

Scapula to thorax kinematics:
Instant of maximal external rotation



Results

Scapula to thorax
kinematics:

Instant of maximal
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Change from before to after fatigue:

scapula anterior tilt:

↑ 3.9° (SD:4.1°) (p=0.042)

scapula upward rotation:

↓ 3.2° (SD:4.1°) (p=0.076)

No change in scapula external
rotation

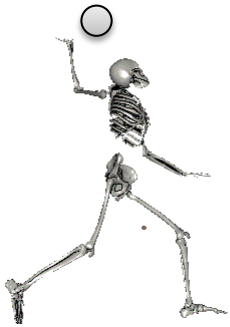


Conclusion

- Fatigue alters the scapula kinematics in a non-favourable way.
- Proper measures to improve scapula kinematics during fatiguing training or match may be warranted.



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Thank
you

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