COMPARISON OF THE SINGLE LEG SQUAT AND SOFTBALL PITCH KINEMATICS

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Purpose: To compare knee valgus during the SLS and trunk kinematics during the softball pitch.

Why the Single Leg Squat?

- The single leg squat (SLS) can identify lumbopelvic hip complex (LPHC) instability [1]
- LPHC instability has been identified as a possible risk factor for throwing athlete pain and injury [2]
- Trunk pathomechanics are related to upper extremity injury in softball players [3,4]
- If instability during the SLS is related to trunk pathomechanics during the pitch, the SLS can be used as an assessment tool for pitchers.

Methods

Electromagnetic tracking system synced with motion analysis software

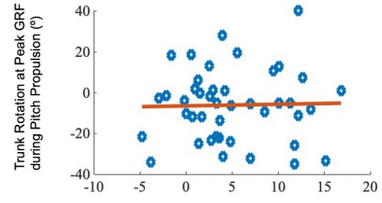
42 pitchers completed bilateral SLSs and threw 3 fastballs

2 Separate Regression Analyses

- Dependent Variables
  - #1: Max stride knee valgus during SLS descent
  - #2: Max push knee valgus during SLS ascent
- Independent Variables
  - Trunk flexion, trunk lateral flexion, and trunk rotation @ 2 different time points
    - #1: Stride foot contact (FC) (Fig B1)
    - #2: Peak propulsive GRF (Fig A1)

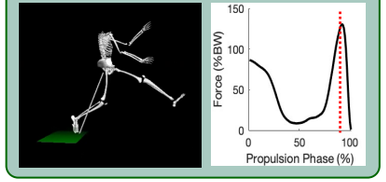
Push Leg Results

- F(3,41) = 3.141, p = .036
- Explained ~13.5% of max push knee valgus during SLS ascent
- Trunk rotation (t = 2.973, p = .005) at peak GRF was a significant predictor (see Fig. A2)



A1) Max Push Knee Valgus during SLS Ascent (°)

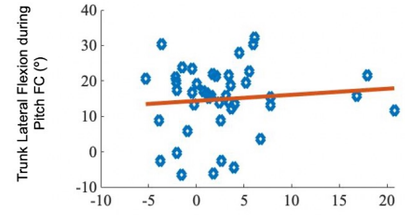
Fig A1. Peak GRF during the Push



Increased push knee valgus during SLS ascent = Increased trunk rotation towards the pitching arm during the push of the pitch

Stride Leg Results

- F(3,41) = 3.232, p = .033
- Explained ~14.0% of max stride knee valgus during SLS descent
- Trunk lateral flexion (t = 2.791, p = .008) at FC was a significant predictor (see Fig. 2B)



B2) Max Stride Knee Valgus during SLS Descent (°)

Fig B1. Foot Contact

Increased stride knee valgus during SLS descent = Increased trunk lateral flexion towards the pitching arm at FC of the pitch

SLS knee valgus is associated with pitch trunk instability

Significance

Increased SLS knee valgus was associated with increased trunk motion during the pitch

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Increased trunk motion during the pitch is related with upper extremity pain in pitchers [3,4]

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- **The SLS may be used to identify pitchers at risk of trunk instability and potentially an increased risk of upper extremity injury.**
- **The SLS is an easy to implement assessment tool for coaches to identify athlete trunk instability that may also limit pitching capability.**

References: [1] Graci et al. (2012). *Gait & Posture; 36(3).* [2] Chaudhari et al. (2014). *Am J of Sports Medicine; 42(11).* [3] Oliver et al. (2019). *Ortho J Sports Med; 7(8).* [4] Oliver et al. (2018). *Int J Sports Med; 39(12).*