CONCLUSIONS: Our results indicate that ACLR individuals may require more practice to adapt to locomotor perturbations than healthy controls. Future research in characterizing the mechanisms that underlie these differences in the rate of adaptation could be important for designing rehabilitation strategies.

1493 Board #146 June 2, 9:00 AM - 10:30 AM
Measurement Properties Of Postural Orientation Errors During Functional Tasks In Patients With Ac Injury
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(No relationships reported)

BACKGROUND: Visual rating of postural orientation, i.e., the ability to stabilize body segments in relation to each other and the environment, is increasingly used for assessing sensorimotor deficiency after knee injury. Altered postural orientation in tasks resembling daily or sport activities appear to be more common in people with knee injury compared with controls. A test battery including tasks of varying difficulty would be helpful in the assessment of deficiencies and in the evaluation of treatment.

PURPOSE: To evaluate measurement properties of a new test battery to assess postural orientation in patients with anterior cruciate ligament (ACL) injury.

METHODS: 51 participants (23 women) with ACL injury performed 7 functional tasks, resembling daily or sport activities: mini squat (MS), single-leg mini squat (SLS), stair ascending (SA), stair descending (SD), forward lunge (FL), drop-jump (DJ) and single-leg hop for distance (SLHD). Postural Orientation Errors (POEs) of the lower extremity (LE), arm and trunk were assessed on-video and scored on a 4-point ordinal scale from 0 (no POEs) to 3 (3 POEs) by two skilled physical therapists. The COSMIN guidelines were applied for determining measurement properties.

RESULTS: Interpretability: Floor effects (<80% scoring 0) were seen for arm displacement in SA and SD, trunk displacement in FL, and reduced LE flexion on landing in hop tasks. Internal consistency: Cronbach’s alpha (α), calculated for the overall POE score within each of the 7 tasks, ranged from 0.209 to 0.857. MS, SA and DJ were excluded from further analysis based on low α (<0.478). Arm displacement was excluded in 2 tasks based on 2 criteria; low inter-item correlations (SLS: 0.017, FL: 0.544) and higher α when removed (SLS: 0.692, FL: 0.904). Inter-rater reliability: Moderate to almost perfect agreement (κ=0.429-0.875) was seen for each POE, and the overall POE score, within each task.

CONCLUSION: The final test battery, including SLS, SD, FL and SLHD, and the POEs fort notation, knee medial to foot position, hip and trunk displacements, showed adequate internal consistency and at least moderate inter-rater reliability. This test battery will be used in further studies to determine construct validity and responsiveness.

1494 Board #147 June 2, 9:00 AM - 10:30 AM
The Effect of Repeated Soccer Ball Heading on Cortico-spinal Excitability and Inhibition
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Postural control has been shown to decline following a bout of soccer ball heading, although mechanisms underlying this impairment remain unclear. Repetitive sub-concussive head impacts (RSHI) may disrupt cortico-spinal pathways to trigger these changes, however, no data exists.

PURPOSE: To establish the effect of RSHI on cortico-spinal excitability and inhibition by repeated soccer ball heading.

METHODS: Twenty healthy male and female soccer players were recruited for baseline and subsequent post intervention measures. Following a familiarisation session (Day 1), participants reported to the laboratory on 4 separate occasions. During Day 2, baseline measures for cortico-spinal excitability and inhibition were recorded using Transcranial Magnetic Stimulation; motor evoked potential amplitude (MEP; excitability) was measured during an isometric contraction at 20% of maximal voluntary contraction (MVC), whereas cortico-silent period (CsP; inhibition) during 100% MVC. Postural control was also measured. Participants then headed machine-projected soccer balls at controlled speeds (20-30 mph) towards a target. Each participant headed 20 balls, directing 10 to left and then right to respective targets. Baseline measures were repeated immediately post, 24h (Day 3), 48h (Day 4) and 2 weeks (Day 5) following heading.

RESULTS: Baseline CsP of Rectus Femoris was 117.8±4.6 ms, which then increased by 4% to 123.1±4.0 ms (p<0.05), immediately following ball heading and returned to baseline (119.9±4.5 ms) by 24h and remained there for the following 2 weeks. Whereas MEP amplitude remained unchanged across time and postural control improved over the first 3 days (p<0.05) and then returned to baseline by 2 weeks post heading.

CONCLUSION: RSHI increased cortico-spinal inhibition, but without concurrent reduction in excitability. The likely reason for the lack of responsive excitability decline is from the low contractile force volumes (20% MVC) used for this measurement, which would have used a smaller proportion of the motor unit pool (early recruited motor units) than that of the inhibitory measurement (100% MVC). This may also explain why RSHI unaffected postural control as it is typically the early recruited units that govern this, not the later recruited ones. However, further research is needed to establish this.

1495 Board #148 June 2, 9:00 AM - 10:30 AM
Variability Structure Measures Differ Between Uninvolved and Tendinopathic Limbs; Typical Kinematic Measures Do Not
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(No relationships reported)

Studies have shown decreased kinematic variability (standard deviation magnitude) in those with overuse & recurrent injury, but have not examined the structure of this variability.

PURPOSE: A case study to explore if joint-level structure of kinematic variability in the involved (IL) & uninvolved (UL) limbs differs in a subject with unilateral Achilles tendinopathy (uAT).

METHODS: 1 uAT male (34y/o) hopped (unipedal) at 2Hz for motion capture. Stance phase was divided into propulsive and weight acceptance phases, each split into 4 bins (Q1-Q4). Uncontrolled manifold analysis (UCM) was used to quantify variance structure in the space of kinematic variables (sagittal plane foot-to-floor, ankle & knee intersegmental angles) with respect to performance (vertical limb length) stabilization. Task-irrelevant (VUCM) & task-relevant (VORT) variance, and the normalized difference between them (IMA) are reported. Averaged kinematic analysis was performed at each time-point with paired t-tests. VUCM, VORT & IMA were compared across stance with paired t-tests.

RESULTS: VUCM-UL > VUCM-IL (p=0.02). VORT-UL & VORT-IL did not differ (p=0.17). IMA-UL > IMA-IL (p=0.002). There were no differences in ankle or knee intersegmental angles between IL & UL at any time-point of stance (0.07±0.08 ankle, 0.08±0.09 knee).

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