Kinesiophobia is strongly associated with altered loading after an ACL reconstruction: Implications for re-injury risk

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**Background**

Despite improvements in anterior cruciate ligament (ACL) reconstruction techniques and rehabilitation protocols, only about 60% of patients return to their pre-injury level of activity.1,2 The fear of reinjury is a common reason cited for an individual’s inability to return to play, and patient’s confidence in their ability to safely return to sport is specific criterion included in the AAOS evidence-based Return to Play Checklist1,2.

Elevated kinesiophobia as measured on the Tampa Scale of Kinesiophobia (TSK) has been previously found to be associated with poorer outcomes. However, the effect of kinesiophobia in ACL reconstructed patients on high impact and challenging tasks associated with re injury risk such as jumping has not been investigated.

The drop vertical jump (DVJ) task is used to assess lower extremity kinematics that could increase an individual’s risk for re-injury risk.3

**Methods**

**Subjects**

20 subjects (11 female, 9 male, Ages 19 ± 3.3 yrs, H 1.73 ± 0.11 m, M 69.1 ± 12.2 kg) with bone patellar bone autografts completed the study. Subjects also had to be cleared to resume sport specific drills.

**DVJ Task**

Subjects stood on a 30.5 cm box and jumped down, landing with each foot on a separate force plate. Upon landing, subjects immediately progressed to a second maximal vertical jump and landed once more. Three trials were completed. The variables were calculated from the second landings as this has been implicated in re-injury risk.3

**Motion Analysis**

3-dimensional motion analysis (Motion Analysis Corp, Santa Rosa, CA) was performed to evaluate the DVJ task. The variables of interest were determined in custom computer code (Labview, National Instruments, Austin, TX). Ground reaction force data was normalized to body weight (BW). The average loading rate was defined as the linear portion of the vertical ground reaction curve between 20-80% of foot contact to initial impact peak. Initial impact peak was determined as the first peak greater than 50N upon ground contact.

**Fear Scale**

The TSK was administered to the subject upon the completion of testing. Subjects were not informed of their performance on the jumping task prior to completing the scale.

**Statistical Analysis**

Associations between loading rate and vertical impact peak to the TSK scale were made with Pearson correlation coefficients with significant relationships defined as p<0.05.

**Results**

**Figure 1:** Demonstration of Drop Vertical Jump Task: (A) standing atop 30.5 cm box, (B) initial landing, (C) maximal jump, (D) second landing at initial vertical impact

**Discussion**

The purpose of this study was to evaluate the relationship between the fear of movement to vertical impact forces and loading rates following an ACL reconstruction.

The need to assess the relationship between how fear and self efficacy relate to knee neuromuscular control after injuries such as an ACL reconstruction has been recently highlighted by an expert panel on sports clinicians and scientists.4

In support of our hypotheses, we found greater kinesiophobia to be associated with a lower weight-bearing in the ACL reconstructed limb. Potentially, subjects who are afraid of loading their reconstructed limb transfer weight to the uninjured limb, increasing the demand placed upon that limb.

The greater forces that the contra lateral limb must absorb may in part be related to the elevated risk of injury associated with the non injured limb.

The lack of relationship to loading rate suggests kinesiophobia is more related to the magnitude of the load and not the subject’s ability to deaccelerate the load.

Potentially, such a strategy reduces the muscular demands on the injured limb. Such a control strategy, once learned, may persist and be a contributing factor to continued quadriceps weakness and heightened re injury risk.

Furthermore, these results suggest that potentially, addressing the increased kinesiophobia after injury may facilitate more normalized loading.

Additionally, in patients with elevated kinesiophobia, cognitive training may be needed before initiating movement retraining or other exercises to improve landing mechanics.

**Clinical Relevance**

These results add to the growing body of literature on the importance of considering fear of movement in rehabilitation. Additionally, we show for the first time a relationship between mechanics on a commonly performed drill and fear of movement. Addressing fear of movement may help facilitate a more normalized movement mechanics.

**Limitations and Future Work**

A limitation of this study was the small sample size and limited analysis of other potential related factors.

Additional prospective studies are needed to assess if these relationships improve over time and determine the optimal time to intervene to reduce subsequent injury risk.

**References**


