

## Recovery of Postural Stability After Anterior Cruciate Ligament Reconstruction

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### Summary:

Since postural stability continues to improve over the first 9 months after ACL reconstruction, return to sport may not be optimal even at 6 months after ACL reconstruction.

### Abstract:

#### Introduction:

There is very little evidence to support any particular timetable for return to sport after anterior cruciate ligament (ACL) reconstruction. The primary objective of the current study is to objectively delineate the timetable for recovery of dynamic postural stability after ACL reconstruction. We hypothesized that dynamic postural stability improves over time after ACL reconstruction.

#### Methods:

33 patients were enrolled in this prospective, IRB-approved study. These patients had an acute ACL rupture and subsequently underwent ACL reconstruction by one of the participating surgeons. Exclusion criteria included either prior knee pathology or concomitant articular cartilage or ligamentous injury; contralateral knee pathology; and other general conditions affecting proprioception or postural stability. Patients underwent dynamic postural stability testing immediately prior to surgery and at 3, 6 and 9 months post-operatively on a multidirectional platform that tracks the user's center of motion while the platform moves randomly in all directions. The amount of time the subject is able to stay on the platform is recorded and a dynamic motion analysis (DMA) score is generated, which reflects the user's ability to maintain his/her center of motion. Longer times and lower scores reflect better dynamic postural stability. Patients were also evaluated with KT-1000 for objective assessment of graft integrity. Student's t-tests were used to compare times and DMA scores at each time point after ACL reconstruction.

#### Results:

15 males and 18 females took part in the study. Average age was 18.8 years (range 14-36). Average Marx activity score was 15.1 (range 10-16). On KT-1000, the mean side-to-side difference improved from 3.3 mm (range -3.3 to 9.9 mm) pre-op to 1.6 mm (range -3.0 to 4.3 mm) at 6 months after surgery. On dynamic postural stability testing, the average time until test failure pre-operatively was  $87.7 \pm 15.4$  seconds, and average times at 3, 6 and 9 months post-operatively were  $95.8 \pm 16.4$  seconds,  $98.2 \pm 14.9$  sec, and  $106.7 \pm 10.5$  seconds, respectively. The average pre-operative DMA score was  $611 \pm 143$  and average DMA scores at 3, 6 and 9 months were  $517 \pm 161$ ,  $481 \pm 151$ , and  $403 \pm 110$ , respectively. Statistically significant improvements in both times and DMA scores were seen between pre-operative testing and all post-operative time points, as well as between 3 months and 9 months.

#### Discussion:

Dynamic postural stability improves over time after ACL reconstruction. We found significantly improved postural

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stability at each post-operative time point when compared to pre-operative scores. We also found significantly improved postural stability between 3 months and 9 months after surgery, a finding which may have implications for return to sport recommendations. The etiology of these improvements is likely multifactorial, including increased quadriceps strength and possibly regeneration of proprioceptive fibers in the ACL graft. These findings suggest optimal return to sport following ACL reconstruction may be more than 6 months after surgery.