The Rate of Torque Development in Patients Post-ACL Reconstruction: A Case Series

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**Background:** Quadriceps (thigh) muscle weakness persists after anterior cruciate ligament (ACL) reconstruction. Quadriceps weakness impairs biomechanics and increases second ACL injury risk. Rate of torque development (RTD), or how quickly a muscle generates strength during movement, may have greater relevance to injury prevention than the magnitude of strength generated.

**Purpose:** Determine differences in quadriceps strength and RTD between the involved and uninvolved limbs among adults post-ACL reconstruction.

**Study Design:** Case series.

**Methods:** Five adults cleared for full activity by their orthopedic surgeons after ACL reconstruction participated (age: 21.00±0.71 years; height: 175.77±8.51 cm; body mass: 71.49±11.40 kg). Patients performed 5 quadriceps maximal voluntary concentric contractions (Nm/kg) on an isokinetic dynamometer. The peak value from repetitions 2-4 was used to quantify strength and calculate RTD. RTD was calculated using slope of the strength-time curve every 10 ms from onset of strength generation to peak strength (Nm/kg*s). Data were collected bilaterally.

**Results:** Neither quadriceps strength (involved: 2.30±0.70 Nm/kg; uninvolved: 2.41±0.58 Nm/kg; \( P=0.50 \)) nor RTD (involved: 2.43±0.96 Nm/kg*s; uninvolved: 2.54±1.18 Nm/kg*s; \( P=0.83 \)) differed between limbs.

**Conclusion:** Despite injury and surgical reconstruction, patients demonstrated adequate strength and RTD in the involved limb quadriceps after returning to full activity. However, given the small sample size, more research is needed to fully understand the influence of injury and reconstruction on quadriceps RTD.

Keywords: rate of torque development; quadriceps; ACL reconstruction