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Achilles tendon rupture (ATR) determines neural and muscular adaptations, possibly reducing the plantar flexors' strength, activation and neuromuscular efficiency (NE). However, it is not clear how ATR affects these outcomes when measured at different muscle lengths. In addition, the long-term (i.e., several months/years) effects of the AT reconstruction and healing processes in these outcomes are not clear. This study compared the plantar flexors' activation, peak-torque and NE between the injured and uninjured limbs of ATR patients several months/years post-surgical repair. Seventeen participants, who suffered ATR and underwent surgical repair, participated in this study. Three plantar flexor maximal voluntary isometric contractions were performed bilaterally at the ankle joint angles of -10° , 0° , 10° , and 30° of plantar flexion on an isokinetic dynamometer. Neuromuscular activity was evaluated by surface electromyography, and quantified by the root mean square (RMS). NE was obtained by the peak-torque/RMS ratio at each angle. Peak-torque decreased with decreasing muscle length from -10° to 30° in both legs, which was expected according to the plantar flexors' force-length relation. The triceps surae's activation of the uninjured leg at 10° was 18% higher than the injured leg. Normalized torque was lower in the injured ($1.5 \pm 0.4 \text{ Nm} \cdot \text{kg}^{-1}$) than the uninjured ($1.7 \pm 0.3 \text{ Nm} \cdot \text{kg}^{-1}$) leg at all angles. NE was similar between sides (injured, $15.4 \pm 12.1 \text{ Nm} \cdot \text{kg}^{-1} / \text{mV} \cdot \text{mV}_{\text{max}}^{-1}$; uninjured, $13.6 \pm 9.6 \text{ Nm} \cdot \text{kg}^{-1} / \text{mV} \cdot \text{mV}_{\text{max}}^{-1}$) and was smaller at 30° compared to the other angles. Several months/years after Achilles tendon reconstruction, the injured leg showed a torque deficit compared to the uninjured leg. As muscle activation was similar between sides and angles, we expected that NE would be higher in the uninjured than the injured side, which was not the case. The large between-subjects variation in RMS values may explain this NE similarity. The deficit in torque production several months/years after Achilles tendon reconstruction may deleteriously affect the uninjured side, justifying long-term rehabilitation programs.