Peroneal Tendon Tears: 50% Rule, a Myth? Biomechanical Cadaveric Evaluation

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Introduction/Purpose: Peroneus brevis tendon tears are frequently diagnosed when ankle instability is present. No clear guideline exists as to when to repair or resect peroneal tendon tears, as most of the available literature uses Meyer's work published in 1924 where a risk of spontaneous rupture would exist when less than 50% of the tendon remains undamaged. Our objective was to analyze the mechanical behavior of cadaveric peroneal tendons subjected to an artificially made damage, compromising 66% of its visible width and tested in a cyclic and failure phase. Our hypothesis was that no failure would be observed in the cyclic phase.

Methods: 8 cadaveric foot-ankle-distal tibia specimens were included in this study. A longitudinal full thickness tendon defect was created, 3 cms in length, centered behind the tip of the fibula, compromising 66% of the visible width of the peroneal tendons as measured by a caliper. The peroneal retinaculum was kept intact. All specimens were mounted onto a special frame specifically designed for the study. All tendons were tested in a cyclic fashion using 100 repetitions between 50N and 200N. If no visual change or tendon failure was observed after the initial testing, a load to failure test was performed until tendon rupture or fixation failure was observed. Tendon stiffness and load to failure were registered. Statistical analysis was performed using the SPSS software.

Results: No tendon failed during the cyclic testing. No defect lengthening was observed after the cyclic phase. On the failure phase, the mean load resisted by the peroneus brevis was 416N, with a 95% confidence interval between 351N – 481 N. The mean load resisted by the peroneus longus was 723N, with a 95% confidence interval between 578N – 868N. All failures were at the level of the defect created. The coefficient of variation was low for both tendons.

Conclusion: A 33% of remaining peroneal tendon was able to resist very high tensile forces; therefore, it can be suggested that a 66% defect can be repaired and does not necessarily need a tenodesis as it has been historically recommended. The high resistance offered by the peroneus longus tendon offers the theoretical potential to use part of it as a free graft to repair peroneus brevis tears. The 50% rule, which determines when a peroneal tendon tear needs a tenodesis or repair, should be revisited.