



Background

Achilles Tendon (AT) ruptures are among the most common tendon injuries in adults: 7-40 ruptures per 100,000 individuals. Majority of evidence indicates no difference between operative and non-operative management of AT ruptures in complication rates, functional outcomes, and return to activity. This case investigates acute effects of ankle hops, heel raises, and knee to wall mobility exercises on the AT stiffness and drop jump performance of a 23-year-old female with a healed AT rupture treated nonoperatively 5 years ago.

Methods

The subject participated in a randomized cross over trial for two weeks; there were a total of three different sessions in which three different interventions were implemented. Interventions included a plyometric double leg wall hop, a dynamic knee to wall stretch, and a single leg heel raise. Pre- and Post- intervention measures each week included: tendon stiffness assessed using the MyotonPRO, and single leg drop jump performance, assessed using the MyJump2 app. Variables assessed from the drop jump included: single leg hop height, reactive strength index (RSI), and ground contact time.



Figure 1: MyotonPRO assessing tendon stiffness.



Figure 2: Researcher utilizing the MyJump2 app to assess metrics during a single leg hop.

Results

Ankle hops did not produce any detectable changes except for tendon stiffness. Both heel raises and knee to wall stretching showed detectable changes in tendon stiffness, ground contact time, RSI, and single leg hop. Notably, heel raises induced a detectable mean change in ground contact time and increased tendon stiffness, although it is unclear if greater tendon stiffness was advantageous or not for our case study subject.

Table 1: Mean change for each intervention

Exercise	Single Leg Hop (inches)	RSI (au)	Ground contact time (ms)	Tendon stiffness (N/m)
Heel Raise	-0.41	-0.07	-22	36
Ankle Hop	.03	-0.003	5	-27
Knee to Wall	-0.33	-0.087	14	-28

Abbreviations: RSI, reactive strength index; Au, arbitrary unit; ms, meter per second; N/m, Newton meter
All highlighted boxes indicate values greater than the MDC (minimal detectable change). Yellow indicates a disadvantageous mean change, green indicates a beneficial mean change. Orange indicates a change that is not beneficial or disadvantageous.

Conclusion/Clinical Relevance

The main finding of the case study indicated that the heel raises were the most favorable intervention demonstrating a greater than minimal detectable change (MDC) for decreased ground contact time. The results are not conclusive as to whether increased tendon stiffness is advantageous for this specific case.



Figure 3: Subject performing a single leg hop to assess hop height, RSI, ground contact time, tendon stiffness, and overall jump performance. A hinged brace locked the knee in full extension to focus the attention on the AT.

References

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