Measuring Achilles Tendon Stiffness in Patients with Haemophilia and Ankle Arthropathy

Carlos Cruz-Montecinos [a,b], Sofía Pérez Alenda [c], Verónica Soto [d], Andrés Oyarzún-Tejeda [b], Felipe Contreras [b], Juan J Carrasco, Felipe Querol

Department of physical therapy. University of Chile, Chile [a]. Laboratory of Biomechanics San José Hospital, Chile [b]. Physiotherapy, University Of Valencia, Valencia, Spain [c]. Roberto del Rio Hospital. Center of Haemophilia [d]. Haemostasis and Thrombosis Unit, University and Polytechnic Hospital La Fe [f]. IDAL, University Of Valencia, Valencia, Spain [d].

1.-Introduction:

- Haemophilic arthropathy (HA) of the ankle primarily affects the tibiotalar and subtalar joint.
- Clinically evaluated aspects have emphasized static imaging features and functional scores. However, tensile aspects of the Achilles tendon have not been explored in depth.
- Stiffness is critical when transferring force from the muscle to the bone, with less stiffness translating into less functionality.

The objectives of the present study were to determine the reliability of repeated stiffness measurements in patients with HA of the ankle and the association of these measurements with Gilbert scores for functional damage of the ankle.

2.-Materials and Methods:

Patients with HA of the ankle that were able to actively place the ankle in a neutral position were recruited for this study.

Figure 1.A) Setup of measurement Achilles tendon stiffness B) Automatized ultrasound tracking was used to evaluate displacement of the myotendinous junction in the medial gastrocnemius by Lucas– Kanade tracker with pyramid and iteration.

Contact: Carlos Cruz-Montecinos (carloscruz@med.uchile.cl)

Stiffness Measurements

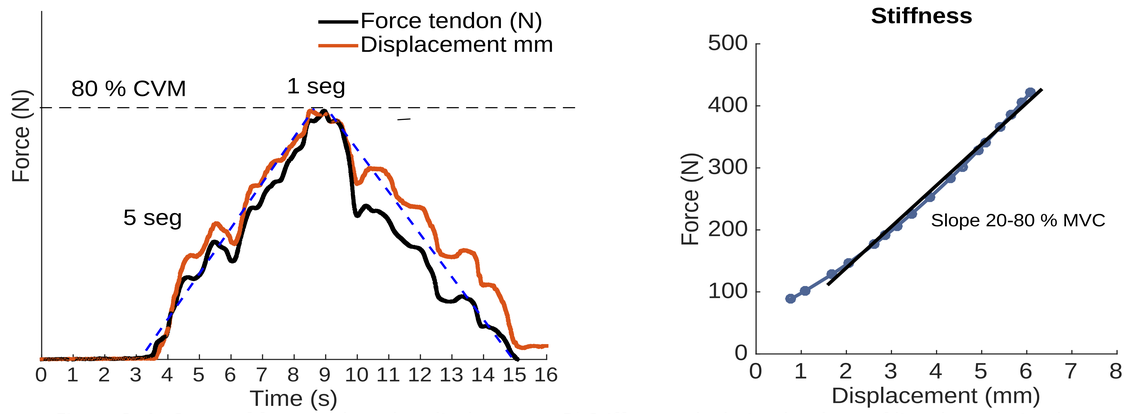

Figure 2. A) Curve of force and tendon displacement B) Stiffness calculation by slope of lineal regression between 20-80 % of MVC.

3.-Results:

- Seven severe and one moderate haemophilia A patients were assessed. All patients were 31 ± 7 years old; had a body mass index of 24.2 ± 3; and a Gilbert score for the ankle of 3 ± 2.
- The intraclass confidence interval of the stiffness measurements was 0.897 [0.75 0.975], and for tendon force, this was 0.994 [0.984 0.999].

	Force	Stiffness	Gilbert	Displacement
Force	1	**r=0.659 (p=0.038)**	**r=-0.764 (p=0.049)**	r=0.200 (p=0.317)
Stiffness		1	**r=-0.767 (p=0.013)**	r=-0.547 (p=0.080)
Gilbert			1	r=0.233 (p=0.289)
Displacement				1

Table 1. The association between stiffness and functional damage of the ankle.

- There was an inverse relationship between Gilbert sores and stiffness measurements (r=0.767; p=0.013), producing a determination coefficient of R^2=0.588 (p=0.026). Moreover, a positive relationship was found between MVC and stiffness (r=0.659; p=0.038).

4.-Conclusions:

- Measuring Achilles tendon stiffness in patients with HA of the ankle is a reliable assessment.
- The results evidence an inverse relationship between stiffness and functional deterioration. Future studies should more deeply evaluate treatment exercises for poor stiffness of the Achilles tendon, as well as implications on mobility.

References:

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