Posterior tibial tendon dysfunction (PTTD) is another issue that has made its way to the eccentric/concentric debate. This dysfunction is theorized to be a tendinosis due to its pathogenesis, therefore rehabilitation efforts in the early stages focus on mechanical support.1 This tendon pathology is often a cause of walking dysfunction, pain, and flatfoot deformity.1 If you remember, the posterior tibialis attaches to the medial navicular, some cuneiforms and the base of the second, third, and fourth metatarsal.2 It’s primary job is to plantarflexor and invert the foot.2 Imagine if that begins to weaken how the arch will begin to collapse. So to support the arch, many studies incorporate an orthotic to prevent excessive lengthening.1 Strengthening this tendon has also been recommended to prevent further degeneration.1

An RCT published in 2009 splits patients into one of three groups: orthotics + stretching, orthotics + stretching + concentric progressive exercise, or orthotics + stretching + eccentric progressive resistive exercise.1 They based this study on the Alfredson articles3,4 that looked at eccentric and concentric exercises in achilles tendinosis. Each patient was given a custom made orthotic to provide mechanical support to the longitudinal arch and a stretching protocol. Exercise programs given based on group.

It is reported that the musculotendinous complex undergoes a larger load during eccentric training and that this type of training may be optimal when the outcome desired is to load the tendon for adaptation.1 It has also been reported that with posterior tibial tendinosis, patients can exhibit an everted calcaneus from a shortened calf musculotendinous complex and flatfoot deformity, therefore this study incorporates stretching to the gastrocnemius and soleus (3 reps x 30 seconds) in the exercise protocol. The outcome measures used were the Foot Functional Index (focused on pain, disability and activity limitation), the 5-Minute Walk Test, and the VAS.

A unique exercise unit called a TibPost Loader was used to maintain the proper passive component in both the concentric and eccentric groups.1 Participants were required to wear supportive shoes and orthotics during exercise to prevent collapsing of the arch. All groups had significant improvement in the FFI total score. They found that the eccentric group had the most improvement in each subcategory and the orthotic only group had the least improvement, but no findings were statistically significant.1

So yes, our argument stands controversial. However, this article brought up a great point and one that Mike discussed in the lecture. Mike mentioned the eccentric group with the heavy backpack load in comparison to the theraband concentric group and questioned the validity of this testing procedure. Obviously this is a little extreme, but bear with me.

This study talks about how they progressively increased resistance in their activity. Resistance, provided by Conforce Constant Force springs, started at 2 lb. Once the patient could complete 15 reps in 3 sets with smooth, good technique, another spring was added. At the end of the three month study, patients in the eccentric group had achieved a training load 3-fold greater than the concentric group, 12.5 lb and 3.7 lb respectively. Why? “Force capabilities are typically 20-60% greater during eccentric actions than during isometric actions and isometric force capabilities exceed concentric force capabilities.”

It seems to me that if you’re going to be comparing these two exercise regimens, this confounding factor needs to be addressed prior to statistical analysis—possibly by testing the contralateral leg on eccentric and concentric strength. Then grouping would have to be based on paired individuals so that their loads were relatable. This is making my head spin… but maybe that’s why we can’t answer the question. Are the parameters all in place before intervention is ever applied? Hm….

References:

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