Almost every condition from the foot to the hip can be attributed to the inability to dorsiflex the ankle mortice and other joints that participate in dorsiflexion. Let’s start by understanding normal versus abnormal dorsiflexion.

There are two normal range of motions, depending on the activity being pursued. If you are walking slowly on a flat surface, normal ROM in dorsiflexion is 10-12 degrees. Anything more challenging than that activity requires what we consider the true normal ROM, which is 18-20 degrees of dorsiflexion.

**Dorsiflexion Biomechanics**

At the late-midstance phase of gait, ankle mortice and subtalar contributions to dorsiflexion have already occurred. In this article, we focus on the midfoot’s contribution to dorsiflexion. Why is this important? During dorsiflexion, the foot and ankle dissipate forces during gait. Without jumping into a complex calculus equation, the amount of force at heel strike or midfoot strike, depending on the type of gait, is miles per hour times body weight. During dorsiflexion, that force must be dissipated or it travels upward through the cephalad joints at about 200 miles per hour.

The conditions related to insufficient dorsiflexion are numerous – consider the consequences of excessive force traveling up the lower extremity to the hips and even the pelvis:

- Shin splints
- Stress fractures
- Plantar fasciitis
- Hip pain
- Sacroiliac pain
- All knee conditions

**Searching for the Origin of the Restriction**
With any prominent joint restriction, it is important to understand the origin of the restriction. Dorsiflexion at the ankle mortice can be due to injury and subsequent splinting or casting. The subtalar’s contribution to dorsiflexion can be severely limited by shoes, especially high heels. The midfoot’s contribution to dorsiflexion is complex. We have searched for an obvious biomechanical connection and have found none, but speculate that wearing tight shoes may be a contributing factor.

*Foot Palpation / Midfoot Dorsiflexion:* During examination, we must include palpation of the foot. Primarily, we are looking for the lack of midfoot dorsiflexion. For contributions of the subtalar and ankle mortise, we have to look upward to lack of core stability. The only primary restriction in the foot is the midfoot’s lack of dorsiflexion. Almost all the others are due to lack of core stability in the lumbar spine and pelvis.

One caveat to improving dorsiflexion is specific to athletes. Many athletes are required to perform squats to improve quadriceps strength and size. Lack of dorsiflexion will transfer the force of the squats to the glutes instead of the quads. Normal squats require dorsiflexion in the 18-20 degree range (normal ROM). You can promise your patient 2-3 inches of thigh growth within a few months once normal dorsiflexion is achieved.

*Second Cuneiform Plantar Glide:* The next examination technique to consider is second cuneiform plantar glide. What we are looking at here is whether we can get the transverse arch to depress, which is important as far as shock absorption is concerned during the gait cycle. We know the second cuneiform is a keystone of that arch, so we are going to assess if the second cuneiform glides in a plantar direction. This would be associated with a more supinated foot.

To assess this, get into a position similar to talocrural joint distraction. Get the knee against the side and use the calcaneus of the hand to contact that row of cuneiforms. The other hand contacts the plantar surface of the foot. Really lock out the tibia again and use the adductors to squeeze, as well as our hands. The adductors help us reinforce the depressive-type motion.

That’s one option; the other option is performed in a standing position, using our outside leg to stabilize the foot and ankle. The hip and knee will both be at 90 degrees. Use the inside hand to take an interphalangeal contact over that second cuneiform. Tissue pull medially a little bit, reinforce that contact and squeeze. See if the transverse arch depresses, and whether you can get that second cuneiform to glide in a plantar direction.
Note: Another way to analyze this movement is to have the patient go into the mid stance phase of gait and see if the arch depresses.

**Plantar Glide Manipulation**

We have a few options for this technique. Let’s start with the seated version, set up much the same way as ankle mortice palpation. We are going to make our contacts, lock out the tibia, elbow to adductors, and add a quick impulse. This one works really well if a patient has large feet and the doctor has small hands.

Another option is set up much like talocrural joint distraction, except we take our interphalangeal contact over the second cuneiform. Tissue pull medially, reinforce that contact, lean back and deliver a quick squeeze.

You can also use a toggle board. Place the patient’s foot on the board. Again, this is also a good option for a small doctor working with relatively large feet compared to the doctor’s hand size.

Get into thrusting position again, dorsiflex, stabilize the knee into the table, get all your weight forward. Take a hypothenar contact over the row of cuneiforms, roll the foot into some pronation, reinforce that contact and thrust straight down. This can also be used as a mobilization.

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*Editor’s note:* This is the fifth article in a series on chiropractic techniques to treat challenging patient presentations. "The Struggle to Heal the Cervical Syndrome" kicked off the series in the June 1, 2014 issue.

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