Dynamic Chiropractic

ORTHOTICS & ORTHOPEADICS

A Podiatrist's Insight on Functional Hallux Limitus and Conservative Care

Q&A WITH DR. HOWARD DANANBERG

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In 2014, I published a two-part series [Jan. 15 and March 1, 2014] on hallux mobility and its importance in athletics and normal gait. In those articles, I attempted to introduce you to the basic mechanics of the hallux in gait and the most common conditions that limit the normal function of the hallux.

At both the 2015 Biotensegrity Summit and the Fascial Research Congress, I was exposed to a variety of brilliant clinicians of many disciplines. One of those clinicians is the renowned podiatrist Dr. Howard Dananberg, who has enjoyed a career filled with awards and achievements, including pioneering the use of in-shoe pressure analysis. He is an advocate for combining the use of foot manipulation and orthotics to treat conditions of the foot, gait and the human frame. Recently, Dr. Dananberg was kind enough to allow me to interview him for *Dynamic Chiropractic*.

Q: Dr. Dananberg, I am familiar with hallux limitus and hallux rigidus, but what do you mean by the term *functional hallux limitus* (FHL) and how does it differ from *structural* hallux limitus?

A: *Functional hallux limitus* is a term first described in podiatry literature in the '70s to describe a precursor to structural hallux limitus. In 1984, I published the first of 30-plus papers on this subject and linked this entity to dysfunctional foot pronation, as well as the chronic recurrence of lower back pain.

FHL can be defined as a condition of the great toe joint in which normal motion is present on non-weight-bearing clinical exam, but during the single-support phase of weight-bearing, range of motion is completely blocked. Since it is most commonly avoided during walking, it may not show any signs of inflammation or pain. Other sites in the foot may be stressed, but since the great toe joint shows normal motion and a lack of any symptoms, it is rarely seen as the etiology to many common foot and postural ailments.

Q: How does 1st metatarsal phalangeal (MTP) joint motion restriction affect the function of the remainder of the foot?

A: The 1st MTP joint is the pivot about which the entire body passes each step. Since the great toe itself, once it touches the ground during walking, *does not move* until toe-off, any restriction at the joint is apt to be seen in the other 25 joints available for compensation within the foot. Pronation, which occurs in the later support phase of walking, can be directly related to this, as an alternative pivot forms to accommodate the failure of the more distal site to move. If this should occur in the mid arch, then a full flat-foot collapse may be the most visible entity.

Since pronation was always believed to be a primary event, there was no real need to see how some other mechanical dysfunction may be responsible. Now that the great toe joint restriction has been identified, specific treatments can be rendered which create exceptional outcomes. In a 1999 paper I published on foot orthotics and lower back pain, the recurrence rate dropped to only 16

percent in medical-endpoint, lower-back-pain subjects.

Q: Since walking involves thousands of step cycles a day, is the stooped-over posture we see in many patients related to the repetitive compensatory process associated with FHL?

A: Imagine walking down a hallway and someone trips you. You would fall forward as momentum acts to continue the body in motion until acted upon by an outside force. The exact same process is involved in walking with FHL; it's just far more subtle. The top "falls" forward, as the bottom is restricted during the move active phase of the gait cycle. But since it happens thousands and thousands of cycles per day, the effect becomes visible over years, if not decades: the small, step-by-step effect becomes the stooped form to which we have been accustomed.

Form follows function. How it is used dictates how it appears. Flexed posture during walking is not an instant event, but instead one which occurs over a lifetime. When patients are seen presenting with very poor posture, understand that this is the result, not the cause of what ails them.

Q: How does FHL affect lower back and neck pain?

A: When FHL is present, stride length decreases as the ability to raise the heel is compromised. (The heel lifts by pivoting at the toe joint. When this ROM is lost, heel lift is impacted.) Shorter stride length equals decreased hip extension. Hip extension, however, is the "preload" for the pre-swing hip and knee flexion required for efficient toe-off. Without preload, the "effortless" toe-off motion is negatively affected, and the hip flexor group must overwork to promote swing motion thousands of cycles a day. Since the hip flexors originate from the lumbar spine and iliac crest, overuse of these muscles will be felt as lower back pain.

To simplify, think of chronic lower back pain as being caused by the weight of the limb being improperly lifted thousands of times per day. When this happens on one side versus the other, asymmetry causes the head to tilt to one side, misbalancing the support musculature in the neck.

Q: Most podiatrists talk about "motion control" when they discuss foot orthotics, but you have talked about "motion enhancement" as a focus of design. How does "motion enhancement" work and what does it represent regarding treatment?

A: The windlass effect, which you have previously written about, is the body's natural method of arch support. Simply extend the great toe joint, and the arch raises and the weight-bearing limb is externally rotated. This then coordinates with pelvic rotation. Motion control was the way most treated arch flattening, with strong arch supports and canting to the orthotics. With motion enhancement, the approach is to create a device which places the toe joint in a position in which normal motion can occur without even momentary restriction. Feet thus support themselves, and rotations of the limb are matched to rotations within the pelvis and spine.

Q: Are there any manipulative techniques which can impact functional hallux limitus, particularly when the site becomes painful, as in "turf toe" or sesamoiditis?

A: When the fibula becomes restricted in its normal translation motion (cranially and laterally), the peroneus longus can become chronically inhibited. Since it is the peroneals which stabilize the entire 1st ray, loss of its normal facilitation creates instability. With the role of muscle to protect the joints about which they function, once inhibited, the effect is pain in and around the great toe joint. This can include a wide variety of symptoms, as mentioned in your question. By manipulating the fibula head and the base, movement is restored, as is normal peroneal strength. Pain relief can be spontaneous.

Q: OK, this question is in the weeds, but since the flexor hallux brevis connects the cuboid to the 1st ray, have you found manipulation of the cuboid beneficial in increasing dorsiflexion of the hallux?

A: The foot is best described as a continuous tension, discontinuous support system (tensegrity). When one of the intrinsic foot muscles becomes inhibited, it can affect a wide variety of normal functional attributes. The flexor hallux brevis has the effect of stabilizing the 1st toe joint, so loss of strength may result in instability.

The other muscle even more commonly affected by a cuboid manipulation is the adductor hallux muscle. It is located on the plantar medial surface of the foot, originating from the calcaneus and inserting into the medial great toe. When dysfunctional, it can create symptoms almost identical to plantar fasciitis.

To distinguish, simply palpate the inferior fascia attachment and then move the palpating thumb to the adductor muscle, which is superior to the fascia itself. If the superior site is more painful, this is more likely to be myositis than fasciitis. For a reason I cannot pinpoint, but have seen clinically countless times, manipulation of the cuboid can restore normal function and spontaneously resolve the symptoms in the heel.

Q: In regard to hallux rigidus, I have used a hard carbon-fiber orthotic to protect the joint from injury and to stiffen the foot to compensate for the reduced windlass effect. What is your opinion of this treatment model?

A: I am not a big fan of carbon-fiber orthotics to restrict motion except on rare occasions. Restriction promotes immobility. I have found that manipulating the fibula causes subsequent peroneal facilitation, and then by adding the appropriate foot orthotic, motion will increase over time and pain will decrease. While not 100 percent effective, many cases improve so rapidly that this was always my "go-to" method of care. The orthotics were always specifically designed to permit plantar flexion of the 1st metatarsal head, thus decompressing the 1st toe joint and allowing improved motion.

I would also add that with manipulation of the 1st metatarsal medial cuneiform site, ROM can be restored to the 1st MTP joint as well ,and thus improve the outcomes from the measures e cited above. If the pain was so pronounced, I would also prescribe a rocker-soled shoe, but add some flex lines, too, so as to promote motion as much as possible. It was the combination which proved most effective.

Q: It seems you are more interested in addressing impairments of the foot and human frame with manipulation, orthotics and/or exercise rather than with drugs or surgery. Can you share your opinion on the effectiveness of manipulation in treating the foot?

A: I stopped doing surgery in 1986, but didn't retire from practice until 2012. I found manipulation and foot orthotics a superior way to address many musculoskeletal issues, [so much so] that this became my primary method of care. There are cases, of course, such as trauma or severe deformity, in which surgery is indicated. There were, however, plenty of podiatrists who were interested in this, so there was no need for one more to do the same thing.