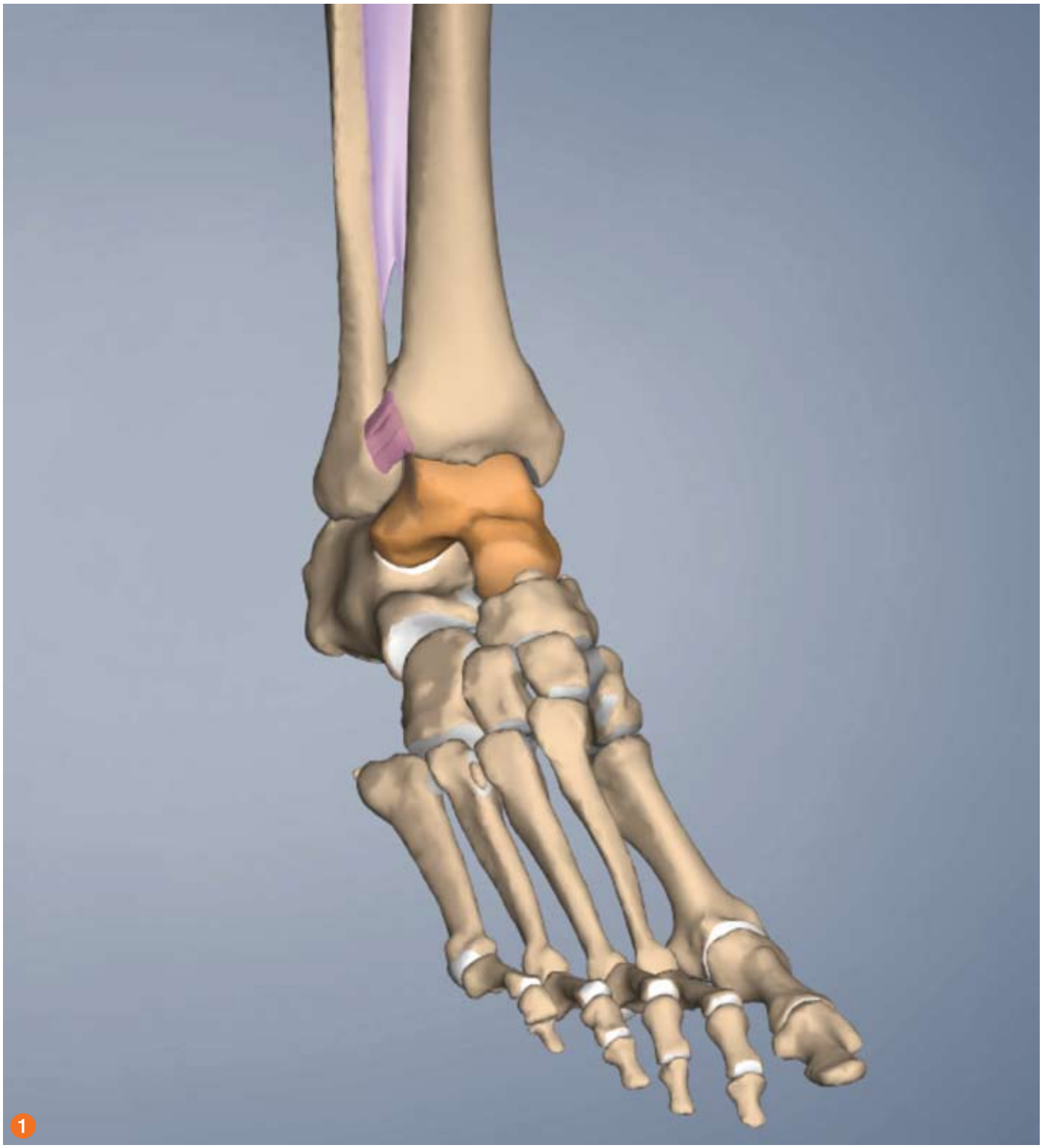
BY TIL LUCHAU

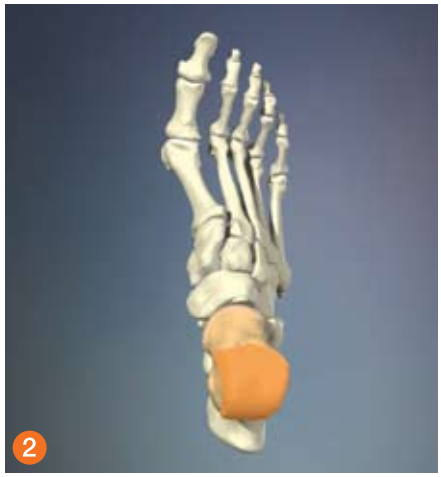


The tibia and fibula form a fork-like mortise around the talus bone (orange), giving the ankle both stability and adaptability. When the interosseous membrane and tibiofibular ligaments (violet) don't allow normal resilience and spring in the ankle mortise, dorsiflexion will be limited. *Image courtesy Primal Pictures. Used with permission.*

WORKING WITH ANKLE MOBILITY, PART 2

For us bipeds, upright movement demands a delicate balance of joint mobility and stability. Ankles provide both. Their mobility allows us to walk, run, jump, skip, and hop; and their inherent stability supports and balances the considerable weight of the rest of the body through all the movements the ankles allow.

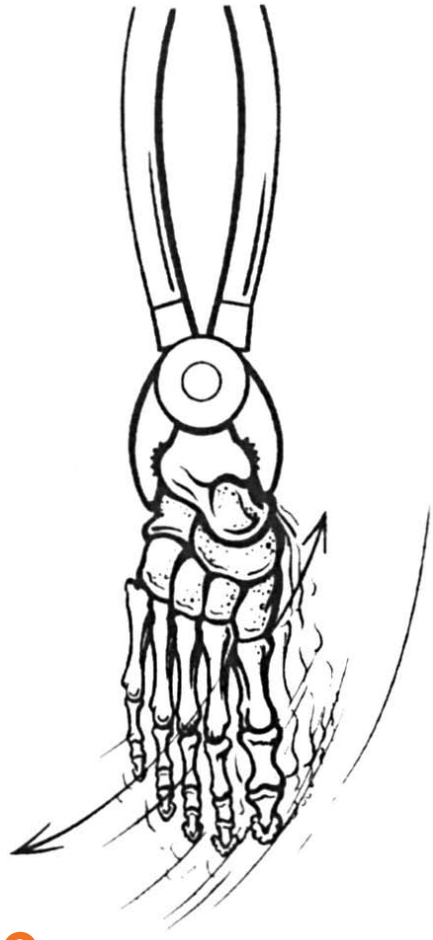
The bones of the ankles have the qualities of mobility and stability built in. The solidly built tibia transmits the body's weight to the talus, the uppermost bone of the foot (Image 1). The smaller fibula rides alongside the tibia like an outrigger, providing an added dimension of stability by wrapping around the talus in a fork-like mortise-and-tenon joint—except that unlike a cabinetmaker's hardwood mortise, this living joint walks, runs, dances, skateboards, stands on tiptoe, plays tennis, etc. It is the talus' unique shape that allows the ankle's solidity and mobility to coexist. Examining the talus, we see that its upper articular surface (the trochlea or tibial plafond) is slightly wedge-shaped (Image 2). This wedge is the tenon that fits inside the mortise formed by the distal ends of the tibia and fibula.



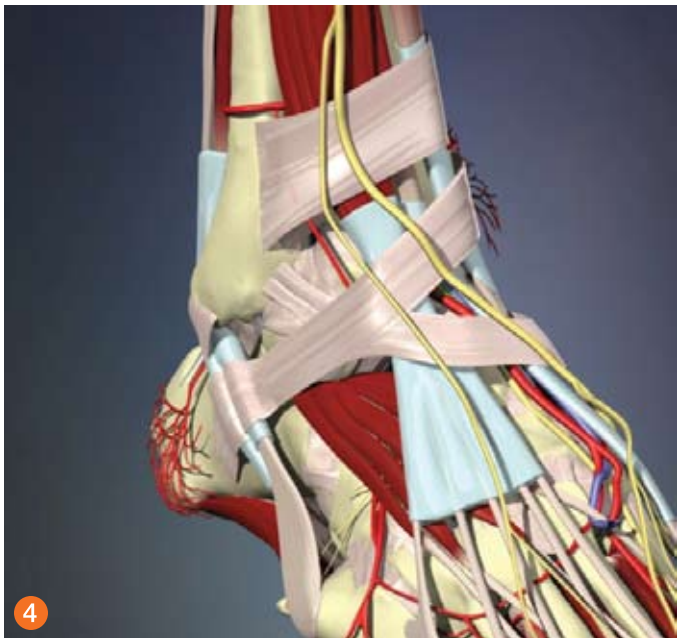
The talus (orange) has a superior articular surface (darker orange) which is 5–6 millimeters wider anteriorly, giving it a wedged shape. The widest part of the wedge moves between the tibia and fibula in dorsiflexion. *Source image courtesy Primal Pictures. Used with permission.*

The narrowest part of the wedge is the posterior plafond[1]—the portion that lies between the tibia and fibula in plantarflexion. This narrowness gives the articulation more play and mobility in plantarflexion, allowing the foot to adapt to uneven surfaces when landing with the midfoot.[2] Conversely, in dorsiflexion the widest part of the wedge-shaped talus completely fills the gap between the tibia and fibula, snugging up the ankle joint and giving boney solidity to the push-off phase, when stability is most needed.

Even when completely dorsiflexed, this form-closed joint is not rigid—at least ideally. In normal function, the connective tissues joining tibia and fibula actually allow some springiness between these two bones, allowing



When adaptability between the tibia and fibula is lost, the widest part of the talus gets squeezed during dorsiflexion. *Image courtesy Eric Franklin, originator of the Franklin Method (www.franklinmethod.com). Used with permission.*



The retinacula are fibrous bandings within the crural fascia. When restricted, they can irritate bursa (light blue) or limit the adaptability needed for full ankle range. *Image courtesy Primal Pictures. Used with permission.*

For the Crural Fascia/Retinacula Technique, use the tips of your curled fingers, along with just a bit of fingernail to feel for and release restricted areas in the crural fascia. *Image courtesy Advanced-Trainings.com.*

an elastic firmness to their hold on the talus. When this slight elasticity in the connective tissues is lost (through hardening due to injury, overuse, or inefficient biomechanics), the tibia and fibula act more like a clamp than a spring (Image 3, page 111). When particularly fixed, this inelasticity stops the talus before full dorsiflexion is reached, and so limits the range of dorsiflexion. This is often experienced by our clients as a jamming or pinching sensation in the front of the ankle during dorsiflexion.

We're referring to this clamping around the talus a "Type 2" dorsiflexion restriction (Type 1 being related to shortness in the tissues of the posterior leg and plantar surface of the foot). We discussed ways to assess these two types of restrictions, and how to work with Type 1 restrictions in the first part of this article ("Myofascial Techniques: Working with Ankle Mobility, Part 1," March/April 2011, page 110). In this second part, we'll look at ways to restore lost dorsiflexion by insuring adaptability of the tibia and fibula around the wedge of the talus.

CRURAL FASCIA/ RETINACULA TECHNIQUE

The crural fascia (or fascia cruris, *cruris* meaning "leg") is a thick membranous wrapping around the lower leg. Like built-in support hose (you didn't know you wore those, did you?), the crural fascia provides the reinforcement, encasing, and undergirding needed by the leg's powerful structures. Releasing this layer helps prepare for the deeper work we'll do with the ankle mortise itself.

Within crural fascia are fibrous bands at places of particular strain—these are the retinacula. Deep to the retinacula, cord-like tendons round the corner of the ankle, on their way from their origins in the leg to their attachments in the foot (Image 4). This is a busy place—after all, with the exception of a few thigh muscles that just make it past the knee, all lower leg muscles cross the ankle into the foot. With the entire force of standing and locomotion being transmitted across the ankle, the restraining structures here are thick, resilient, and dense. This is all fine and well, except when they do their restraining too well. Too-tight retinacula can irritate the bursa underneath them; they can also limit the adaptability of the ankle by binding the tendons they overlie, or by restricting the necessary spreading of the tibia and fibula around the talus.

To ensure adaptability of the crural fascia and the retinacula, we'll use the ends of our curled fingers to feel for and release any restrictions in these outer layers. Using just a bit of your nails, push proximally rather than pull distally, feeling for the fibrous layers of fascia just under the skin (Image 5). Imagine pushing up your client's tight-but-sagging socks. The pressure is firm; your pace is slow and patient. Rather than gliding over the skin, take

YOU CAN SEE THESE TECHNIQUES IN *MASSAGE & BODYWORK'S* DIGITAL EDITION, WHICH FEATURES A VIDEO CLIP FROM ADVANCED-TRAININGS.COM'S ADVANCED MYOFASCIAL TECHNIQUES DVD AND SEMINAR SERIES. THE LINK IS AVAILABLE AT BOTH WWW.MASSAGEANDBODYWORK.COM AND WWW.ABMP.COM.

time to feel for and get ahold of the tough layers just deep to the dermis. Feel for fibrous banding here, and for any adhesion to the layers below. Ask for slow, active dorsiflexion and plantarflexion. Apply sensitive but firm proximal pressure to these areas; wait for release. Work the crural fascia of the entire lower half of the leg, as well as the retinacula of the ankle and the fascia dorsalis pedis of the instep.

TIBIALIS ANTERIOR TECHNIQUE

Although the tibialis anterior muscle won't usually restrict ankle dorsiflexion directly, we include it in our protocol here as preparation for the Interosseous Membrane Technique. The tibialis anterior and the long toe extensors that lie deep to it need to be released before work with the deepest interosseous layer is comfortable for the client. Additionally, some clients will feel discomfort or cramping in the tibialis anterior region with the Dorsiflexion Test ("Working with Ankle Mobility, Part 1," March/April 2011, page 111). This usually accompanies a Type 2 dorsiflexion restriction (related to tibia/fibula mortise restrictions, rather than shortened ankle plantarflexors).

Using a soft fist or the flat of your forearm, slowly glide along the length of the tibialis anterior, encouraging length and release as your client actively dorsiflexes and plantarflexes the ankle. Feel for release particularly on the eccentric (plantarflexion) phase. Once the outer layers have been worked, repeat the technique, adding active toe flexion and extension to access and release the deeper extensor digitorum longus and extensor hallucis longus (Image 6).

Although direction of work (proximal to distal, or the reverse) is usually not a crucial factor in our approach, you'll often find that one direction feels more effective to you and to the client. As an experiment, check both directions, and get descriptive feedback about the difference.

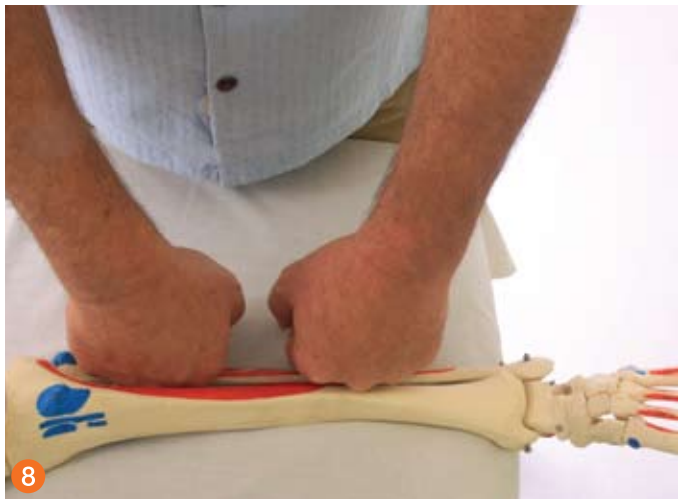
Using a soft fist combined with active dorsiflexion in the Tibialis Anterior Technique. *Image courtesy Advanced-Trainings.com.*

INTEROSSEOUS MEMBRANE TECHNIQUE

Remember that the tibia and fibula will limit dorsiflexion if they can't spread slightly around the widest part of the talar wedge. The deepest and strongest structures that restrict this widening are the interosseous membrane and its associated tibiofibular ligaments.

Even after preparing the outer layers of the lower leg with the two preceding techniques, we aren't able to directly touch the deep interosseous membrane of the leg—at least not comfortably. To work it, we can use the fibula as a convenient handle to laterally stretch the tough membrane and ligaments that join it to the tibia. *Fibula* is Latin for "brooch," after its resemblance (along with the tibia) to a clasp, with the fibula being the pin. This technique opens the clasp, allowing more room for the talus to move.

Use the knuckles of both soft fists to pull on the medial side of the fibula, using your weight rather than muscular strength (Images 7 and 8, page 115). Ask your client for full dorsiflexion, pausing at the end range of the movement so that the widest



The Interosseous Membrane Technique: After preparing the outer layers of the lower leg, use the knuckles of a soft fist to encourage the fibula to release laterally, giving more room for the talus. Use your client's active dorsiflexion to bring the widest part of the talus between the tibia and fibula, augmenting the release. *Images courtesy Advanced-Trainings.com.*

part of the talar wedge can assist your widening of the tibial/fibular space. Your pressure is quite full, but still comfortable for your client. The very strong interosseous structures respond slowly, so be sure to wait long enough to feel the subtle release and widening of the fibula away from the tibia. It can be helpful to imagine unrolling the two bones of the lower leg like the two parts of a scroll. There is, in fact, a small amount of external fibular rotation with dorsiflexion,[3] and adding this dimension to your lower leg work can increase its effectiveness.

Once you've felt the fibula respond, shift your knuckles to a new place, repeating this technique along the entire length of the fibula, particularly at the distal end where the tibiofibular ligaments are located.

After working just one leg in this way, you might ask your client to stand and walk a few steps, comparing the left and right legs. Often the difference in mobility and stability will be profound. (Then, be sure to work the second leg as well!)

TOO LOOSE OR TOO TIGHT?

Our overall intention with these techniques is to improve any dorsiflexion restrictions by ensuring that the fibula and tibia can widen slightly around the wedge-shape talus, particularly in full dorsiflexion. But what about ankles that already seem too mobile, such as in overpronation patterns, or unstable ankles that twist easily? While both pronation and ankle sprains can theoretically cause laxity in the talar mortis, in practice, both sprains and pronation are often associated with limited dorsiflexion at the talar/tibial joint. In the Dorsiflexion Test, you'll see people using a combination of foot pronation, eversion, and external tibial rotation when talar dorsiflexion is limited. Similarly, losing the front/back adaptability that dorsiflexion provides can increase lateral forces on the ankle, leading to easier ankle turning and rolling. There are exceptional cases where there is clearly too much laxity between the tibia and fibula, often as the result of congenital conditions or from an unhealed injury. These clients can benefit from a referral to an orthopedist or rehabilitation specialist. Empirically, we've found that in even these cases, and certainly in the majority of people, whenever a limitation in dorsiflexion is improved, clients experience improvement in balance, stability, and less tendency toward overpronation, even when there is also an apparent side-to-side hypermobility. **m&b**

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Notes

1. *For word buffs, a plafond is an ornately decorated ceiling. It originates from the French* plat *"flat," plus* fond *"bottom, base." Accordingly, the tibial plafond could be thought of as both an ornate, wedge-shaped ceiling for the talus, and a base for the tibia above it.*
2. *In contrast to an adaptable landing with the midfoot, a thumping heel strike is harder and less accommodating, due in part to the wider part of the talus being wedged between the malleoli of the tibia and fibula. The timing of the knee's extension in the gait cycle plays a large roll in determining which part of the foot contacts the ground first.*
3. *J. Forst et al., "Effect of Upper Tibial Osteotomy on Fibula Movement and Ankle Joint Motion,"* Archives of Orthopaedic and Trauma Surgery *112, no. 5: 239–42.*