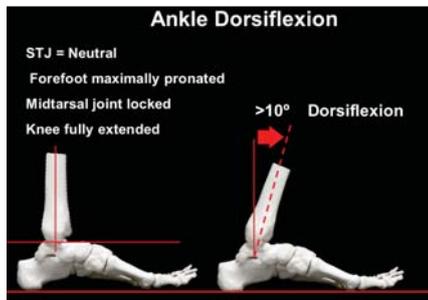


Manipulation of the Ankle

By Howard J. Dananberg, DPM

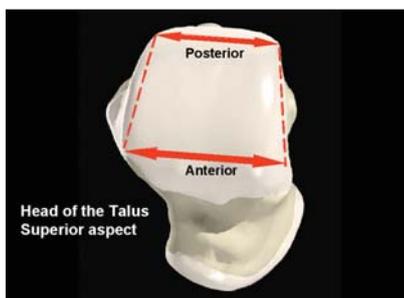
Ankle Equinus (AE) represents a limitation of ankle joint dorsiflexion. Podiatric literature has established a reference for this with 10° of dorsiflexion with the knee extended as the benchmark.¹



During gait, ankle joint dorsiflexion range of motion serves to permit the advancing body to move over the planted foot, while the foot remains in full ground contact. AE has been referred to as one of the primary etiologies of excessive pronation. Patients with AE often have a very difficult problem using rigid, neutral type custom foot orthotics, and there are case histories of orthotic shell fracture when control of their pronation is attempted with this type of orthotic. Treatment for AE ranges from the use of heel lifts to accommodate the dorsiflexion limitation to surgical lengthening of the Achilles tendon. This article will introduce the concept of manipulation to immediately remedy this situation as well as re-establish muscular facilitation, often resultant from the motion restriction.

The use of manual manipulation of the various joints of the body predates Hippocrates.² It has most commonly been used on the spinal vertebra as a treatment of lower back pain symptoms, but any joint within the body can benefit from the techniques used to mobilize them. Understanding both the techniques applicable to manipulation of the ankle as well as the indications for its use can add a very valuable treatment tool to the practising clinician.

Basics of Ankle Anatomy



The ankle is a hinge joint formed superiorly by the distal tibia and fibula and inferiorly by the dome of the talus. The talar dome is shaped as a truncated pyramid, with the wider aspect anterior and the narrower portion posterior. During dorsiflexion, the wider portion of the talar dome must glide posteriorly. This is permitted

by the ability of the fibula to translate. Its moves cranially and laterally, widening the mortise and permitting the talus its required range of motion. Strong ligamentous structures surround the joint providing stability. On the anterior, medial and lateral aspects, there are retinaculum which maintain the tendons in proper position which also aid in creating an intrinsic stability.³

It is the failure of fibula translation that forms the basis for AE. The inability of the fibula to move through its normal motion range, blocks the wider portion of the talus from gliding posteriorly. This results in a clinical restriction in dorsiflexion while the knee is fully extended. Considering that limb extension is a basic requirement for efficient ambulation, the ramifications of AE can start to be appreciated.

Arthrogenic Inhibition:

Muscles receive signals from the central nervous system that either strengthen (facilitation) or weaken (inhibition) them. Normally, facilitation and inhibition cycle through their respective stages, managing both the subtle and gross motions present within the human anatomy and activities of daily living. Under certain conditions, either facilitation or inhibition can be disrupted, thus causing a substantial imbalance within the body.⁴ Cerebral Palsy, for instance, can be the direct result of failure of inhibition to normally occur. Muscles so affected will become hypertonic and even spastic, and prevent the normal relaxation mechanisms required for normal function or gait. Classic scissors gait in the affected patient is characterized by flexed knee function due to over activity of the hamstrings. Conversely, when muscles are inhibited on a habitual basis, then the attributes of normal joint motions and protection these muscles afford to the joints about which they function is restricted. This can result in either deformity and/or pain.

Arthrogenic inhibition refers to a circumstance in which any particular muscle becomes weakened due to a functional joint aberration either remote to or adjacent to it. In my clinical experience, the most common inhibition due to restriction in fibula translation are the peroneal muscles. Arising from the fibula head, and coursing inferiorly, they route posterior to the lateral malleolus and insert either into the base of the 5th metatarsal (p. brevis) or the base of the 1st metatarsal and medial cuneiform.

Indications for ankle manipulation:

There is a wide array of symptoms potentially associated with AE and fibula restriction. While not all conditions stem from AE or its associated muscle inhibition, examining for this may solve a problem that otherwise defies traditional methods of care. Following is a list of these symptoms and the potential reasons for why these may be associated with AE.

- Plantar fasciitis
 - Chronic or acute

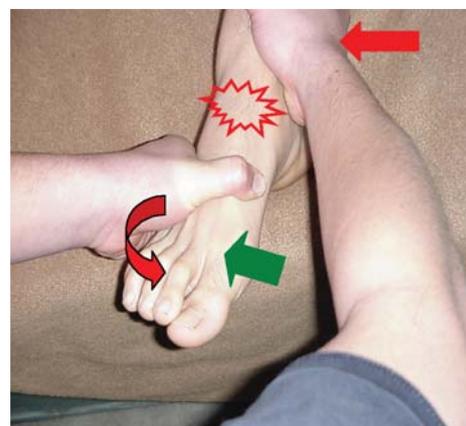
- Achilles Tendonitis
 - With or without tendon edema
- 1st MTP joint pain including sesamoiditis
 - With associated peroneal inhibition
- Lateral Ankle pain/chronic sprain
 - With associated peroneal weakness
- Forefoot pain of vague origin
 - Premature overload of the forefoot during gait
- Knee pain
 - associated with chronic flexed position in gait related to AE

Examination Technique:

The subject can be seen either sitting on an exam chair or lying supine on a table. The knee is fully extended. The examiner then grasps the foot, and placed the subtalar joint in neutral position by palpating the congruity of the of the talonavicular joint. Once neutral is established, the ankle is then passively dorsiflexed to end range, ensuring that the subject does not relax the knee from its fully extended position. Motion of either less than 10 degrees, and/or motion less than the opposite side, and/or normal motion but with a sense that the patient is ordinarily hypermobile will all indicate AE exists. The examiner can also palpate the head of the fibula prior to attempting ankle dorsiflexion. In normal circumstances, the fibula head can be felt to translate, but no palpable motion is detected when restriction exists.

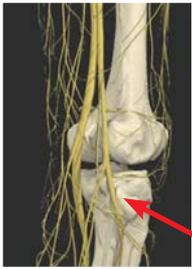
The next phase of the exam is to check for peroneal muscle strength. The knee is now flexed, and the heel of the foot is placed on the exam table. The foot is then maximally plantarflexed and everted (foot down and sole turned outward). For the right foot, the examiner then places their right hand over the medial malleolus. The left hand then grasps the foot, from the midfoot distally. The subject is then asked to forcibly maintain the everted position, while the examiner tries to invert the foot.

CAUTION: Care should be taken if weakness is already suspected, as this, if performed in an overly aggressive fashion, may be painful to the patient.



Technique:

In order to adequately mobilize the ankle, both the proximal and distal ends of the fibula need to be addressed. First, the fibula head is identified. This is located on the lateral side of the lower leg, just inferior to the knee joint.



Fibula Head – Peroneal nerve

This is a postero-lateral view of the knee joint.

Note the posterior location of the fibula relative to the tibia.

Note the location of the peroneal nerve within the peroneal notch at the fibula head.

CAUTION: the common peroneal nerve courses over the posterior aspect of the head and within the peroneal notch. Care must be taken not to be overly aggressive in this area and risk injury to the nerve.

CAUTION: the proximal portion of the manipulation requires that the knee be rapidly flexed. Pre-examination of the availability of the range of motion is necessary to avoid injury.

The description is designed for right sided technique. The hands used change for the opposite limb.



The left hand of the examiner palpates the fibula head. The hand then placed posterior to the head, with the base of the palm abutting the head of the fibula. The knee is then fully flexed until gentle pressure of the fibula head against the hand is felt. The lower portion of the leg is then grasped with the right hand.



A rapid but not overly forcefully flexion of the leg is then performed, further pressing the fibula head into the palm. There is no sound made during this portion of the adjustment. Should knee flexion be found to be restricted during the initial exam, then rather than use the palm, use increasing amounts of the forearm against the fibula head. The increasing width of the forearm will reduce the flexion requirements of the knee, but should not negatively impact the adjustment process.

Once completed, attention is then directed to the ankle joint. The ankle is grasped with both hands,

with the thumbs crossed over the dorsal aspect of the talus. The index and middle fingers then reach around to the posterior aspect of the ankle joint, grasping the posterior calcaneus, just below the Achilles tendon insertion. The grasp is tightened, and then traction (longitudinal distraction) of the ankle is performed for 20-30 seconds.



While maintaining the distracted position, the ankle is maximally dorsiflexed to “end feel” (end range of gentle dorsiflexion). Once achieved, a rapid but not overly forcefully rotational adjustment is then performed, moving the talus subtly beyond the “end feel” positional. Joint cavitation type noise may be audible with this manoeuvre.



Once completed, replace the knee in the fully extended position and then check for ankle dorsiflexion. Assisting the patient in their active dorsiflexion can be helpful to establish the improved range at this time. Examination of peroneal strength is now possible. If performed properly, then the strength will have returned to normal.



BEFORE

AFTER

Conclusion

Manipulation of the ankle has excellent potential to assist in the treatment of a variety of many foot ailments. Care must be taken to avoid injury to the common peroneal nerve, knee joint and peroneal tendons, but the outcomes are well worth the careful approach. Maintenance of foot position and the prevention of overpronation using VHD type orthotics can prevent or significantly delay recurrences. Patients should also be advised on proper stretching of the triceps surae which also assists in the prevention of recurrence.

REFERENCES

1. Root, M., Weed, J & Orien, W 1977 Abnormal and Normal Function of the Foot, Clinical Biomechanics Corp., Los Angeles, CA
2. Dananberg, HJ, Shearstone, J, Guiliano, M “Manipulation Method for the Treatment of Ankle Equinus, “Journal of the American Podiatric

ARTICLE #5

Medical Association, 90:8 September, 2000 pp 385-389

3. Gray, H, Goss, M, Gray's Anatomy, Lea & Febiger, Philadelphia, 1966, p264

4. McVey, E, Palmieri, R, Docherty, C, Zinder, S, etal, Arthrogenic Muscle Inhibition in the Leg Muscles of Subjects Exhibiting Functional Ankle Instability, Foot & Ankle International, 26:12, December 2005.

www.vasylimedical.com

