Figure 11: Virabhadrasana (Warrior III pose, supported by table), working to enhance support in the leg.

Figure 12: Virabhadrasana (Warrior III pose, supported by table), spreading the foot.

Conclusion

The yoga asana serves as a starting point for innovative positioning. Use these ideas as a place to begin and you will find yourself crafting customized positional strategies to meet your client's specific needs. Whenever a client has a position or a motion that is difficult, we can use kinesiologically based thinking to create a positional strategy that puts some strain in the body to bring out the lines that need to be lengthened. This is useful for endless creative applications: dancers working on Latin hip motion, acrobats learning to do a back walkover, or martial artists who want to be able to kick higher. Creative positioning for sessions can provide the additional challenge needed for an advanced body to shift to the next level of grace and integration.

Photography: David Wagner.

Model: Gianna Piccardo of Balanced Wellness, http://privateyogatherapy.com

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The Arches of the Feet, Part 2

The Feet and Their Relationship to the Rest of the Body

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Author's Note: Part 1 of this article was published in the June 2011 issue of Structural Integration: The Journal of the Rolf Institute®. *In it, the arches of the feet and the lower legs were discussed in detail. It is recommended reading as a basis for what follows.*

The feet are part of a living system and, as such, play a role in both cause and effect in the orchestra of the whole body. As, on one hand, they determine much of what happens in the body above them, they are also determined in many ways by the more skywardly-placed parts of the system. When considering the feet, it is not enough to simply think of them in structural terms and look at the static balance that they demonstrate in standing. The feet were made for walking and the structure of the foot is a direct result of the way that weight, propulsion, and movement transfer through it. Thus, to consider the feet without also thinking about movement is to only have half the tools necessary to help the client make a lasting change. And weight transfer through the feet has everything to do with the way that the feet relate to the rest of the body.

There are two qualities of weight transfer, each one being essential in its own way for a healthy, fluid gait. Weight transfer through the sagittal plane, from heel strike to toe-off, propels the body forward in space. The triplanar movement of inversion/eversion happens at the subtalar joint, mostly in the coronal plane. The combination of the sagittal movement from heel to toe and the coronal movement at the subtalar joint is responsible for the transfer of weight from lateral arch at heel strike to medial arch at toe-off. This diagonal movement across the foot shifts the balance from the weight-bearing leg to the leg that is to become the weight-bearing leg and is vital for contralateral movement and balance of abduction and adduction throughout the body.

One of the most important formative factors for the foot is the way that weight transfers through it, and these parameters also affect the rest of the body. In a study with African women[1] (often quoted by Hubert Godard in his tonic function classes), researchers discovered that when these women carried thirty kilos or more on their heads as they walked, they expended far less energy in walking long distances than when they were not carrying this weight. Why was this? The weight of the burden on the woman's head called forth the cervical righting reflex, an activating of the longus colli, which calls the core stability system into action. When the core stabilizing muscles are working, weight transfer through the feet changes and this led to an overall economy of function that was concrete and measurable.

The Key Relationships of the Feet

In this section, we will examine the feet in relationship to three of the major segments and functions of the body: the general gravity center, the upper gravity center, and the eyes and vestibular system.

The Feet and the General Gravity Center

The general gravity center, also known as simply G, is the center of mass of the whole body and is located in the abdomen slightly below the level of the umbilicus. The relationship of the general gravity center to the feet determines how weight will transfer across the foot in the sagittal plane, from front to back. In the best of all possible worlds, the center of mass passes directly over the center of the foot in the one-legged-stance moment of the gait. However, if the general gravity center is either too anterior or too posterior to Chopart's (midtarsal) joint at heel strike, then the alignment of the center of mass and the center of the foot will not happen, causing a series of alterations throughout the body.

When the general gravity center is too far posterior to Chopart's joint at heel strike,

the client will walk heavy on his heels, and there will be little action of the toes in the push-off phase of the gait. There are many repercussions to this pattern. It can result in heel spurs from too much impact on the calcaneus. The action of the psoas in walking is also closely related to the toe hinge. The reader can notice this effect himself by walking without using his toes and noticing what happens to the psoas – then contrasting and allowing the toe hinge to activate and observing the effect of this on the psoas. When the general gravity center is posterior, the psoas often acts as a tonic muscle, becoming fixed at its distal insertion and mobile at its proximal insertion, to keep the trunk from falling back behind the support of the lower body.

Another effect of having G posterior to the midtarsal joint is that the tibialis anterior begins to work overtime in an effort to lever the upper body forward over the foot. The tibialis anterior, by nature of its insertion on the inferior aspect of the first cuneiform and metarsal, is a supinator of the foot. When it works overtime it holds the foot in supination, which prevents the foot from going into the full triplanar movement of inversion, thus impeding the very vital inversion/eversion dynamic of the foot. When the tibialis anterior is chronically contracted, as happens in this pattern, it will couple with the extensor digitorum longus and the extensor hallucis longus. This leads to the toes being held up. As was explained in Part 1 of the article, when the toes can't find the ground, the metatarsal arch (the 'suction cup') flattens and the vital aspect of support for the push-off phase of the walk and the stability of the subtalar joint gets lost.

The opposite pattern, when G is anterior to Chopart's joint at heel strike, is recognizable by the fact that the client's back heel lifts off before the heel strike of the front foot has time to occur. The person who has G anterior gives the impression of always being on the ball of the foot. In this pattern, there is a chronic contraction of the soleus to keep the body from falling forward across the foot. Once again, this pattern has repercussions throughout the foot and the rest of the body. The soleus is one of the shock absorbers of the leg when jumping and landing and running. When it is in a state of chronic contraction, shock absorption is lost and increased impact results. The soleus also holds the heel in varus pattern (inversion) and prevents the foot from fully softening to palpate and adjust to the ground. The overall dynamic that emerges is one of a certain rigidity in the lower leg and foot. Also, because the heel is less active and less in contact with the ground, the dynamic spiral that occurs through the longitudinal axis of the foot just before toe-off gets lost.

The Feet and the Upper Gravity Center

The upper gravity center – which is a local gravity center for the trunk, head, and arms – is known as G′ (G prime). It sits at about the level of the mid-thoracic junction, in front of the T4-T5 area. G′ is a center, too, of relationship. It moves forward and back in response to our mirroring of and relating to others. When the upper gravity center is in neutral position, it rests over the center of a line that joins the two hip joints. Like the lower gravity center, however, it tends to have a preference for shifting either anterior or posterior of this neutral line as the body prepares to move, and this shift away from neutral will have direct consequences on the feet. The shifting of G′ directly effects the diagonal weight transfer across the foot and the dynamic of inversion and eversion.

How does this happen? When G′ shifts back behind its neutral point, the femurs tend to rotate externally. When G′ shifts forward of neutral, the femurs tend to rotate internally. If you would like to feel this for yourself, it is quite simple to produce the effect. Stand up, leave G′ way behind, and take a little walk – you will feel your femurs rotate externally within the first few steps. Shifting G′ forward will produce the opposite effect – once again, within a few steps you will feel your femurs begin to rotate internally.

When the femurs rotate internally during the swing-through phase of gait, there is a shift towards inversion and internal rotation in the foot. This gives the foot a hoof-like quality because of the rigidity that accompanies exaggerated inversion. On the other hand, when G′ falls behind and the femurs rotate externally, this brings the foot, as well, into external rotation in the swing phase of the gait, which means that when the foot lands, it tends to land in eversion.

The foot, being a highly elastic and adaptable structure, is formed by the way it is used. If it lands in eversion, and the weight transfers through the foot with eversion as the neutral basis for movement, this will tend to produce a foot with eversion preference and eventually with eversion fixations. In the case of the foot with a strong eversion preference, this continual collapse can also lead to a situation where the foot reacts by creating an opposite and compensatory pattern of inversion and rigidity. This is what happens with a client who has the varus foot (high, fixed arches) and, when the client releases his arches, suddenly collapses into the opposite pattern of valgus. This particular version of high, fixed arches is more complex to treat than the true varus foot, because to reach a higher level of balance both patterns must be treated, along with the client's tendency to move with the upper weight center posterior.

The Feet and the Eyes and the Vestibular System

The placement of both lower and upper gravity center has much to do with the functioning of the vestibular system, or more specifically, the otholithic system, the part of the vestibular system that deals with our perception of where we are in in relation to the downward pull of gravity. The otholitic system works with the feet and the eyes to give us our sense of where we are in space and gravity.

The otholithic system can be inhibited by many factors, such as aging, trauma, high-impact accidents, and falls to name a few. When vestibular information gets inhibited, the body reacts in the same way as it does when falling and preparing for impact: the hip and ankle joints flex and brace. It is not uncommon for problems in the hip joint to have, at their root, a less-than-optimally functioning otholithic system. When the sense of the plumb line of gravity suffers, so do hips and feet. As the body feels the unconscious sense of insecurity that comes from a diminished relationship with gravity, both posture and gait change. The head comes forward of the gravity line and steps shorten. This is easily observed in elderly people whose vestibular system has already been damaged by aging. When steps shorten, the full mobility of the foot is no longer used and the many joints of the foot become immobile and eventually fixated.

One factor that affects the otholithic system is the way that we use our eyes. Over-focused vision has been shown to inhibit vestibular information in the vestibular cortex of the brain.[2] In our modern culture, which is fast, goal- and performance-driven and given to many hours in front of small screens (which narrow the visual field), overfocused vision is quickly becoming the normal use of the visual sense.

Peripheral vision and focal vision are processed by different areas of the brain. Peripheral vision perceives context, movement, and the whole, and is processed in the brain stem and subcortical areas. Focal vision perceives detail, narrow focus, and color and is processed in the cortex. Peripheral vision has been called 'postural vision' and been shown to make balance (postural sway) more efficient.[3] The use of the eyes has a direct effect on the foot. The more focal the vision, the more the weight of the body shifts towards the front and medial aspect of the foot. Peripheral vision without focus, on the other hand, brings the weight heelwards and towards the lateral arches. When focal and peripheral vision balance each other, weight tends to distribute throughout the body and the foot more evenly. This effect of vision on the distribution of weight on the feet can be felt quite easily. Find a place to stand where you have the possibility of a wide field of vision. Stand barefoot, to be able to feel your feet on the floor more easily. Pick a point out ahead and focus on it with a very hard focus and notice what happens to the weight on your feet. Then contrast this with what happens when you allow your vision to soften and take in the whole, wide visual field, without focusing on anything in particular.

When focal vision overpowers peripheral vision, vestibular function is inhibited and the effects of this show up throughout the entire body, appearing as patterns of bracing and rigidity in the legs, loss of the gravity line through the head and neck, and changes in gait and stride length. Thus, consideration of the foot must be taken in the context of the larger gravity-orienting tripod (feet, eyes, vestibular system) to which it belongs.

Conclusion

The foot is a complex and fascinating structure. In the study of the foot, the border between biomechanics and movement quickly becomes meaningless. The foot is formed by the way that it is used, and the way that it is used is a reflection of all the factors that contribute to human movement, from the mechanical and structural level to the psychobiological level. Likewise, the preferences and fixations that appear in the foot have effects throughout the whole body. In this sense, the foot brings us inevitably back to one of Dr. Rolf's statements:

> I'm dealing with problems in the body, where there is never just one cause. I'd like you to have more reality on the circular processes that do not *act* on the body, but that are the body. The body process is not linear, it is circular; always, it is circular. One thing goes awry and its effects go on and on and on and on. A body is a web, connecting everything with everything else.[4]

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Rehab Notes, Post-Hallux-Rigidus Surgery

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Introduction

I am writing this now in the hope that my own experience with post-cheilectomy-surgery rehabilitation will be helpful for Rolfers working with a client in this situation, or even for themselves. I wrote in an earlier article ("Why I Got Foot Surgery"; June 2011 issue of *Structural Integration: The Journal of the Rolf Institute®*) about some of the elements involved in the decision to have surgery, and the immediate aftermath of the surgery to my left foot. It has, at this writing, been nine months since the procedure.

I had good experiences working with skilled Rolfing® Structural Integration (SI) practitioners familiar with the nerve confusion that appears to be pain but that can go away with gentle and persistent attention in weight-bearing. This meant, after the initial swelling went down, trying to find the left metatarsal-phalangeal (MTP) joint in a sort-of 'freeze-frame' of the toe-off phase of gait. While at first hard to deal with, the pain mostly went away after I realized that there was nothing organically wrong with that position, and that this was the best way to feed nourishing blood to the joint capsules and ligaments there. Motion, as they say, is lotion. I then progressed to

Figure 1: Rock walking to enhance whole-foot adaptability and proprioception, moving all directions: sideways, in a circle, backwards and forwards.

rocking forwards and back through the left-foot-back, toe-off position, paying attention also to the involvement on the right foot and hip. I preferred, at the beginning, to use a piece of foam (a swimming 'noodle' cut length-wise) under the left foot, for padding and proprioceptive reinforcement. I had long enjoyed walking on smooth, one-inch river rocks to stimulate articulate adaptive motion in the foot, too, and spent much time standing on squash balls just in front of the heel to stimulate Chopart's-joint awareness in gait.