The Arches of the Feet in Standing and Walking, Part 1

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Author's note: I would like to thank Hubert Godard for his vision in synthesizing a model of understanding that has contributed so much to Rolfing Structural Integration (SI), and for his help with this article. In Part 2 of the article, in a future issue, the relationship of the foot to the rest of the body will be discussed.

The Feet

The feet are a fascinating and vital part of the human structure. They have the double function of adapting to the transmission of weight from above and the irregularities of the ground below. As adaptive structures they will shape-shift to reflect what goes on above them in the rest of the body, and as support structures they are also responsible for the quality of movement that ensues throughout the body during gait and other activities. In this article, we will be considering the arches of the feet to better understand how the feet function in standing and walking, and how we, as Rolfers, can intervene to help them. We will also be taking a look at the three-dimensional movement that occurs throughout the foot in all of its functions.

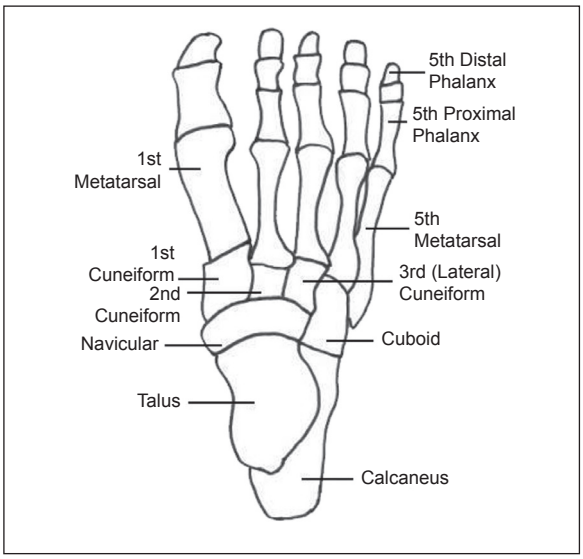

Figure 1: The right foot.

The feet have two longitudinal arches and one transverse arch. The lateral arch of the foot is composed of the calcaneus, the cuboid and the fourth and fifth metatarsals and phalanges. The lateral arch maintains contact with the ground and gives support to the entire lateral line of the body. The medial arch is composed of the calcaneus, the talus, the navicular, the three cuneiforms, and the metatarsals and phalanges of the first through third toes. It is built for and rests upon the lateral arch. The transverse arch consists of the navicular, the cuboid, the cuneiforms, and the metatarsals. Its function is to transfer weight, support, and propulsion, and to modulate the relative softening or stiffening of the foot in the various moments of the gait.

Many times the study of the feet and the gait is limited to thinking of the anterior/posterior movement that occurs across the feet as we walk. However, there is a finely orchestrated movement of the foot that occurs in all three planes that helps the foot to propel the leg forward and adapt to the ground and that sets up core stability and contralateral movement throughout the rest of the body. For discussion of this tri-planar movement, we will speak of the foot in three different sections: the hindfoot (composed of the calcaneus and talus); the mid-foot (composed of the navicular, cuboid and three cuneiforms); and the forefoot (composed of the metatarsals and phalanges).

The Hindfoot, the Mid-foot, and the Movements of Inversion/Eversion

The hindfoot and the mid-foot are built to move between the movements of inversion and eversion. According to Kapandji,[1] inversion/eversion occurs at the subtalar (subtalar: the articulation of the talus and calcaneus) and midtarsal (midtarsal: the articulation of the navicular and cuboid on the talus and calcaneus, respectively) joints. The midtarsal joint is also known as Chopart's joint. Inversion is composed of supination, adduction, and plantar flexion, while eversion is composed of pronation, abduction, and dorsiflexion.

For structural integrators, the movements of inversion and eversion represent two different qualities of support, which affect the entire structure, and they also represent distinct moments in gait. The foot was made to be able to move easily between these two extremes, allowing the capacity for the best possible stability and the best possible mobility. It is common, however, to have a preference for the movement of inversion or the movement of eversion, and this preference will set up a series of predictable changes throughout the rest of the body. When the foot moves into inversion it stiffens, becoming a structure that is built for stability and cohesiveness. When the foot moves into eversion, it becomes looser and more elastic. Both of these qualities are needed for a healthy functioning foot.

Inversion and eversion are movements in which the tibia participates as well. Inversion involves the external rotation of the tibia, and eversion the internal rotation of the tibia. Psychobiologically speaking, inversion and eversion each have their own character. Those clients that have difficulty in finding the ground often have feet that have a preference for inversion. Thus, the functions that come with the movement of grounding, such as the capacity to let down, breathe out, and to surrender may be more challenging for them. Clients who find it hard to engage space orientation often have a preference for eversion. With space orientation comes the capacity to move up and out, to breathe in and to engage relationally – and the client who gets held in eversion may find these functions more challenging.

The alternation between inversion and eversion that happens within each step cycle is also the alternation between the active movement of touching the ground and the passive movement of allowing oneself to be touched. When the foot is in inversion the rigidity needed to support the weight of the body and lever it forward across the foot makes for a movement where the client has the active sense of touching

the ground with his foot. As the foot goes into eversion, phenomenologically the tide turns. This is a moment when the foot becomes receptive; thus, the foot has the sense of being touched by the ground. Only then can it make the necessary adaptations to the irregularities of support and surface that come from below. The elasticity of eversion happens when the sole of the foot is alive and sensing, as the firmness of inversion happens when the foot is actively reaching towards the ground.[2]

The "Suction Cup" – The Three-Plane Movement of the Forefoot

The forefoot – the metatarsal-phalangeal region – is a key area of support for the whole foot and the stability of all three arches. If we look at Figure 2, we will see that because the joint space between the first metatarsal and the first cuneiform is diagonal, when the first metatarsal plantar flexes, the movement of plantar flexion is accompanied by pronation and abduction (movement of the first metatarsal towards the center line of the foot). Likewise, the joint interspace of the fifth metatarsal is also oblique, in such a way that when the fifth metatarsal plantar flexes, it is accompanied by supination and adduction (movement of the fifth metatarsal towards the center of the foot).[3]

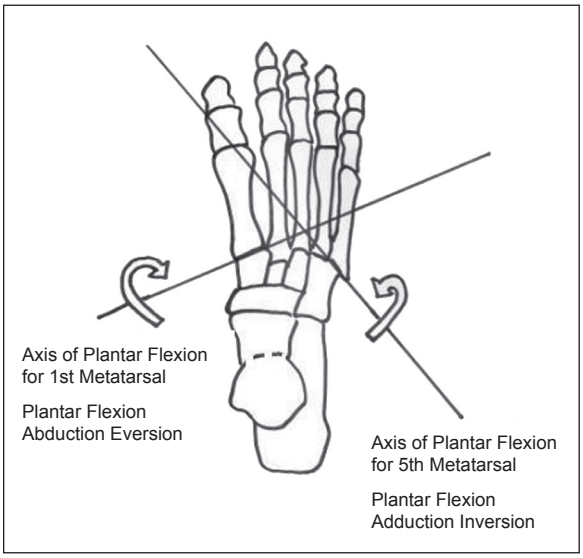

Figure 2: The "Suction Cup". Right foot, seen from above.

When the metatarsals plantar flex on the mid-foot, the second metatarsal pronates along with the first metatarsal, and the third and fourth metatarsals supinate together with the fifth metatarsal. This creates a suction-cup-like dynamic that makes the metatarsals into a coherent, diaphragm-like dome, lifting and narrowing on plantar flexion, and dropping and widening on dorsiflexion. This movement accompanies inversion and eversion and lends support and stability to the hindfoot. The suction cup lifts to accompany inversion and drops to accompany eversion.

If the first and second rays are not able to drop, creating the inside of this suction cup when weight comes into the foot, then the whole diaphragm action of the forefoot will become unavailable, and the calcaneus will lose the support of the forefoot and fall into a valgus pattern.[4] If the first and second metatarsals lose their reach – their capacity to lengthen out of the mid-foot, then the mid- and hindfoot get caught in the high fixed pattern of inversion preference.[5]

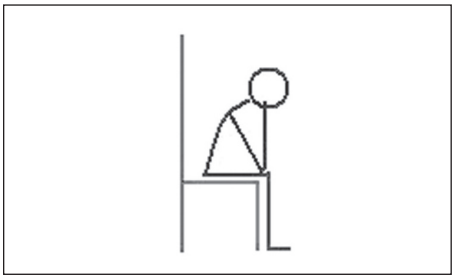

Figure 3: Position for feeling the suction cup.

Exploration – Feeling the Suction Cup

This exploration can be used to experience the suction cup for oneself – it is also extremely useful for working with clients in the sitting position.

Start by sitting on a surface that allows your weight to rest in front of your sit bones. From here, lean forward, propping your elbows on your knees and resting your head in your hands. This places a significant portion of your weight into the feet. Allow the whole foot to lengthen and flatten.

Play with one foot at a time. Find the lateral arch. Make sure that it has a solid contact all along the outer edge and that the cuboid is firmly planted on the floor.

Now, maintaining the contact of the lateral arch, lift the first and second rays (metatarsals and phalanges) all the way back to the articulation of the metatarsals with the cuneiforms. Slowly, keeping the contact of the lateral arch and especially the cuboid on the ground, lower first the second ray and then the first ray, allowing the base of the metatarsal to lengthen floorwards out of the cuneiforms, until the whole first and second rays come to rest on the floor, long and easy.

If you managed to keep the contact of the lateral arch while you did this, you will feel the suction cup activate. After doing this one or two times, stand up and walk and notice what changed.

What Happens in the Feet During the Gait?

Now that we have reviewed the tri-planar movement, we are ready to discuss what occurs in the feet during the various moments of the gait. The movement of walking is a continuous alternation between stability and elasticity, rotation and counter-rotation, and active and receptive sensing functions.

The biggest factor that determines the structure of a foot is the way that it is used during the gait.[6] According to Dananberg,[7,8] during a day that includes only eighty minutes of weight-bearing activity, each leg completes 2500 cycles. It is easy to imagine, from a Rolfer's viewpoint, how even a small dysfunction in the feet can create problems throughout the body, as it is multiplied by constant use. It also makes sense to think that a healthy functioning foot, with its movement repeated many times can be a potent force for well-being.

The transfer of weight and the foot's responses to it are different in walking and running. In this section the responses for a slow to moderate pace of walking will be discussed.

We can think of this trajectory of weight and movement across the foot in terms of five different moments in gait:

- Heel strike
- Preparation for receiving the weight of the center of mass (COM) of the body directly over the foot
- Full weight-bearing (COM directly over the foot)

- Preparation for toe-off
- Toe-off

Heel Strike: As the foot prepares for heel strike it supinates, and as the weight comes down at heel strike it moves into inversion. As the foot impacts the ground, it needs a certain quality of stability to sustain it. The impact of the foot at heel strike is an important moment in the walk, and has been shown to be a factor in creating healthy bone mass in the leg.

Preparation for Receiving the Weight of the COM – Softening, Palpation and Adjusting: Immediately after heel strike, as the weight of the body begins to transfer forward over the foot, the tibia rotates internally creating a movement towards eversion (not full eversion, just enough to soften the foot).[8] This is a moment where the foot becomes flexible, a moment where it receives the information from the ground, almost as an organ of palpation.[9] This sensing capacity in the foot is essential for the foot to be able to adapt to any irregularities in the terrain. Without it, the smallest pebble can be a cause for injury or loss of balance. In a healthy foot, at this moment, the lateral arch is planted on the floor and the medial arch softens down towards the ground. As the foot palpates the ground, it is able to adjust to any irregularities in that surface. The midtarsal region widens and drops and the foot lengthens longitudinally. This widening and dropping sets off a stretch reflex that causes the stirrup muscles (tibialis posterior and peroneus longus) to contract, taking the foot into its next moment. The lateral arch plants first, then, as the medial arch comes down the palpation and adjustment happens.

Full Weight-Bearing (COM directly over the foot): As the COM comes to be supported directly over the foot there is a movement back in the direction of inversion – once again, not full inversion, just enough of the turning of the bones to make the foot a more stable structure for weight-bearing. The tibia begins to rotate externally, taking the hindfoot and mid-foot into inversion. The stirrup muscles help this by lifting the transverse arch of the mid-foot, while, as the weight crosses the foot, the forefoot becomes active in a slight plantar flexion that causes the transverse arch in the forefoot to lift and narrow. The whole movement can be viewed somewhat like what we see in a toilet plunger that has been pressed downward and returns upwards on its own.

Moving towards Toe-Off: The COM continues to move forward over the foot. As the big toe begins to dorsiflex, the plantar aponeurosis (which attaches at the base of the calcaneum and the proximal metatarsal phalangeal joint of the big toe) is passively stretched. This creates a tightening that travels along the sole of the foot and brings force closure (healthy, physiological joint compression) at the calcaneal-cuboid joint. This stabilizes the foot from ankle to mid-foot and to forefoot, just as it is undergoing a considerable amount of force, caught between the resistance of the ground and the transfer of the COM forward.[10] This keeps the foot from wobbling as it goes into toe-off. The foot remains firm, while the plantar aponeurosis stretches like an elastic band – a movement that will release kinetic energy at toe-off and help propel the body forward.

As the heel begins to leave the ground, the fully extended stance leg internally rotates at the hip joint, a movement that transmits down through the tibia into the medial arch, creating a movement of eversion. The forefoot, which is still in weight-bearing function, continues in the stiffer, suction-cup mode that accompanies inversion. There is a twist that occurs along the longitudinal axis of the foot, as both the mid-and hindfoot soften evert, counter-rotating to the forefoot which is still in the high narrow movement of the suction cup. This counter-rotation stores kinetic energy and moves the weight of the COM forward across the foot, and medially towards the big toe and in the direction of the other foot as the other lower limb prepares to become the new support for the body weight.

Toe-Off: At toe-off, everything changes. Going into toe-off, the spring of the foot, along with the release of the plantar fascia, propels the lower limb into the swing phase of the walk. As the leg begins the swing phase, the knee goes from full extension to flexion, the hip also flexes, and the gastrocnemius gives a phasic burst of activity, just before the foot leaves the ground. This, because the knee is now flexed (and the weight of the body is being supported on the new stance leg), causes the leg to swing forward. There is a short burst of psoas activity at this moment as well, which was ideally set off by a stretch reflex as the psoas was passively lengthened by the extension of the hip in preparation for toe-off.[11] The alternate pulsing and releasing of the psoas, as it stretches, contracts, and then releases for the leg to swing through, is an important factor for maintaining a healthy lumbar spine. It is dependant on the functioning of the toe hinge. Any curious Rolfer can feel this for himself, simply by walking with the toe hinge immobilized and noticing what happens to the action of the psoas.

The Feet in Standing and Weight-bearing

In this section we look at what happens in the feet while standing, weight-bearing, and in the crucial moments of preparation for, and full support of, the COM over the stance foot in the gait. This is the moment when the weight of the whole body is supported over one foot so that the other leg can swing through. The quality of support in the foot in this instant either sets up or breaks down core stability throughout the rest of the body. It is also the beginning of contralateral movement and an important factor in balance of the pelvic floor. A stable relationship of the arches at the moment when the weight of the body is supported on one leg engages the transverses abdominus / multifidus system, allows the hip joint of the swing leg to release, and the psoas to work. By the same token, if the foot wobbles at this moment or is unable to soften towards the floor, the global muscles will grab and tighten, the hip joint of the contralateral leg will shorten, and the psoas will not be able to perform its function.

As the alternating movements of inversion and eversion happen when we are walking, so this dynamic relationship also comes into play when we are standing. Remember that movements in the direction of inversion stiffen and raise the arches and movements in the direction of eversion soften and lower the arches. As weight comes into the foot, the lateral arch is meant to support the medial arch and the forefoot is meant to support both of them. In the mid-foot and subtalar region, this support for the medial arch from the lateral arch occurs where the talus rests on the calcaneus, at the sustentaculum tali, and also where the navicular and third cuneiform articulate with the cuboid. If you look at the medial face of a cuboid bone you will see that it falls in a diagonal line, and that it contains two articular surfaces, one for the navicular and one for the third cuneiform, which rest upon this diagonal support from the cuboid.

In terms of the myofascial elements, there are many that contribute to the support of the three arches. Some of the best-known are the spring ligament and the deltoid ligament, which support the medial arch, the flexor digitorum brevis and the plantar fascia, which act like bowstrings to the bow of both of the longitudinal arches of the foot, and the tibialis posterior and peroneus longus, which act as "stirrups" underneath the transverse arch of the mid-foot to support and connect. When Dr. Rolf spoke of the problem of flat feet really being "flat shins," she was speaking about these stirrup muscles.[12] When the tibialis posterior and the peroneus longus become incapacitated by an immobile interosseous membrane, caused by lack of appropriate motion through the foot, ankle, and leg, the arches of the feet lose their right relationship.

In the best of all possible worlds, when weight goes into the foot there is differentiation and width across the transverse arch in the mid-foot, and in the metatarsal arch as well. Each longitudinal arch is able to maintain its function and has enough elasticity and spring to release towards the ground with loading. The lateral arch gets longer and makes contact with the ground – the cuboid, specifically, resting more floorward. The lateral arch stays in contact with the ground and the medial arch is also able to lengthen and release its weight floorward, while still remaining on top of and supported by the lateral arch. The whole mid-tarsal region widens. The forefoot activates, supporting the mid-and hindfoot.

The action of the transverse arch, both in the mid-foot and in the forefoot, is an essential part of the relationship between the longitudinal arches. When the mid-foot is not able to widen, either the medial arch collapses inward, pulling the lateral arch up off the floor as it goes down, or the lateral arch holds the medial arch captive, not allowing it to soften and lengthen. When the forefoot is not able to activate, support for the rest of the foot is lost. The importance of the forefoot as support for the mid- and hindfoot can be understood if we use the analogy of an architectural arch. In an architectural arch the keystone – the stone that sits in the middle of the arch itself – is held in place by the balanced gravitational forces coming from the two lateral pillars of the arch. If you remove the keystone, the lateral pillars fall and, likewise, if you remove one of the lateral pillars the whole arch falls. By the same token, if we think of the longitudinal medial arch of the foot as an architectural arch, we will understand that the keystone (the navicular) is able to stay at the apex of the arch exactly because of the downward movement of the calcaneus in the hindfoot and of the first and second metatarsals in the forefoot. If the first and second metatarsals become held – either by coordinative habit or structural fixation – in a pattern of dorsiflexion, then the front pillar of the medial longitudinal arch gets lost. This leads to valgus (pronation) of the calcaneus, and collapse of the medial arch.

Three Variations on the Theme of Less-than-Optimal Function

For the purposes of this article, we will examine three patterns of less-than-optimal function and discuss some tips for working with them.

1. The flat foot – the one that has little arch or spring in either the lateral or the medial arch. In weight-bearing we do not see the diagonal line of collapse towards the inner arch – instead both arches are fully in contact with the ground. This is the foot that makes a footprint where the whole sole of the foot is visible in the sand. In medical literature this foot is not distinguished from the valgus foot (the collapsing inner arch), but for the Rolfer, it is worth making a distinction

2. Varus – the high fixed arch. There are two kinds of high fixed arches, one in which the immobility of the arch is the baseline pattern, and another in which the high, rigid structure of the arches is a reaction to an underlying pattern of collapse. (The latter will be discussed in Part 2 of this article in a subsequent issue.) The high fixed arch foot has a preference for the movement of inversion. Both arches are rigid: the lateral arch is in contact with the ground, but the medial arch does not release its weight floorward. The footprint that this foot leaves on the beach is one in which only the lateral border of the foot and the toes appear.

3. Valgus – the collapsing arch. In this case, when the foot is in weight-bearing mode, the weight falls in a diagonal line towards the inner arch, and as the weight falls into the inner arch, the outer arch loses its stabilizing contact with the ground. This is the foot that has a strong preference for the movement of eversion. It is a soft elastic foot and generally goes with valgus knees ('X knees').

Flat Feet (Flat Shins)

In the flat foot, the main issue is in the stirrup muscles of the lower leg. Palpation of the space between tibia and fibula will reveal that the tissue over the interosseous membrane is in need of differentiation. The plantar fascia, too, will be hardened, although there is more of a tendency in this foot towards eversion. This is the classic example that Rolf describes of flat feet coming from flat shins, and the most important aspect of treatment is to get the stirrup muscles functioning again.



Figure 4: Flat shins.

When doing tissue work, concentrate on getting the interosseous membrane to "breathe" again and softening the plantar fascia. Coordinative work is very important as well to get the stirrup muscles working again. A good coordinative exercise for this is to have the client stand on a step, with his heels hanging off. He can hold one tennis ball between his medial malleoli and another between his knees (this helps

maintain the alignment of the joints of the leg as he works on waking up the stirrup muscles). He starts the exercise with his heels hanging down below the level of the step and then rises up until all his weight is on the balls of his feet. Then down, and up again. When teaching this exercise, the best results will be obtained if the Rolfer educates the client to pay attention to the overall alignment of his body. If help for balance is needed, the client can steady himself with a hand on the wall.

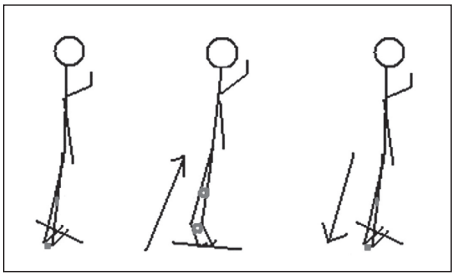

Figure 5: Exercise for developing the stirrup muscles.

High Fixed Arches (Varus)

When working with high fixed arches, a lot of soft-tissue and articular intervention is needed to soften the plantar fascia and interosseous membrane and to mobilize joints of the feet that may have become fixated. This is frequently accompanied by a coordinative pattern in which the client has become accustomed to using his foot more like a hoof than like a foot. Once the mobility of the joints of the feet and the myofascial elements have been addressed, it may be necessary to spend some time helping the client to feel how his foot is now able to work and how to incorporate that into his daily movement patterns.

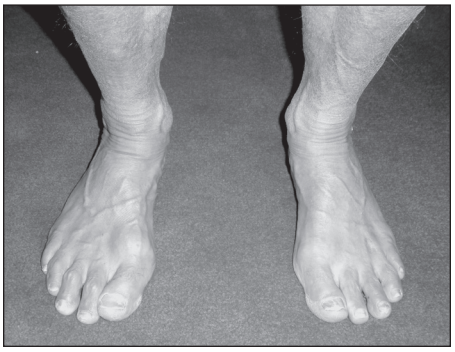

Figure 6: High fixed arches.

A very simple solution to this is to ask the client to do the movement of toes up and down while you are working with the sole of his foot, and to help him to be conscious of allowing movement to flow through the places that he tends to brace and hold rigid. This addresses the coordinative, proprioceptive component together with the structural component. At the end of the session, to take this a step further, you can work with the client seated on the edge of the table: have him rock forward in such a way that his weight falls into his feet, and use the loading of the feet to help him feel the mobility that can occur in the joints where his tendency is to not allow movement to occur.

Remember that the client who has a preference for inversion often has the tendency to touch the ground with his foot but not to allow himself to be touched. Thus any work that helps him to feel with the sole of his foot, and notice the nuances of movement that are available, will be welcome. Often, the problem begins at an even more basic level – the client with an inversion-preference foot is often a client who has difficulty allowing the weight of his body to reach the ground. He holds himself up off the ground and braces in the hip, knee, and ankle joints so that the weight does not flow downward. This habit is something that needs to be addressed throughout all interventions with the client.

Paradoxically, there are a certain percentage of clients with high fixed arches who, once they allow weight to come down through the feet, will manifest collapsing arches. In this case, the underlying pattern of the collapsed arches will have to be addressed for the client to be able to stop holding himself up through his arches and be able to find the ground.

The Collapsing Arch (Valgus)

The client who has a collapsing arch is a client whose foot has a preference for the elastic moment of the gait when the foot adjusts to the ground. In the mid- and hindfoot we find eversion, and in the forefoot a tendency for loss of support from the first and second metatarsals. In the client with valgus feet, tissue work needs to address the alignment of hip, knee, and ankle, with special attention being paid to the adductors and their connection into the pelvic floor – the classic "Fourth-Hour" line work.

In this foot type, which tends to be overly flexible, attention needs to be paid to any eversion fixation in the subtalar or midtarsal regions, or joint restrictions between cuneiforms and metatarsals that



Figures 7a and 7b: The collapsing arch.

may prevent the first two metatarsals from plantar-flexing. In the valgus foot, the need to increase stability is a very big part of the conversation and this is an issue that has a large coordinative component.

When speaking of stability for the valgus foot, there are two issues: one is the relationship of the lateral and medial arches, and the other is about the stabilizing activity of the forefoot for the calcaneus. When the diaphragm of the forefoot is working, there is support for the mid- and hindfoot portion of the medial longitudinal arch. The capacity of the first two rays to drop towards the floor creates the front end of this arch. When the first two rays lift up off the floor, the arch falls, the calcaneum rolls medially, and the mid-foot portion of the medial arch collapses. Thus, although it may seem counterintuitive, the problem behind many collapsing inner arches is the incapacity of the first two rays to come down towards the floor.

Support for the medial arch also comes from the lateral arch. In Rolf's words: "As we have observed, the inner arch rests on the outer arch. Contrary to the usual notion, it is the latter that breaks down first, the inner arch follows. Establishment of a normal foot demands a secure establishment of the outer and lateral arch first."[13]

What is it, however, that securely establishes the lateral arch? Often it is a coordinative

issue, which involves the client learning to contact the ground with the lateral arch and maintain this contact as weight loads into the rest of the foot. It has to do with the relationship of medial to lateral arch and the capacity for the suction cup of the forefoot to activate while the transverse arch in the mid-foot widens. It also has to do with the size of the neutral zone of the subtalar joint and the joints between the third cuneiform and navicular with the cuboid.

The neutral zone of a joint is defined as the range of movement near the joint's neutral position where minimal resistance is given by the osteoligamentous structures. Once movement of the joint takes it out of the neutral zone, the elastic zone is engaged. The elastic zone is the part of movement that goes from the end of the neutral zone to the physiological limit of the joint.[14] In the elastic zone the myofascial elements that come into play on the joint are engaged. When there has been injury, degeneration, or simply poor coordination patterns, the neutral zone becomes too wide and the joint becomes less stable. There is a longer interval of time between the beginning of movement and the action of the stabilizing structures around the joint. In the case of the foot, what this means is that as the foot prepares for loading, there is a wobble that destabilizes the foot and sets off a chain of undesirable reactions throughout the rest of the body.

This configuration needs to be addressed at the coordinative level, by helping the client, to establish a firm connection of the lateral arch with the floor and activate the forefoot. Once this support is in place, without losing that connection he allows the medial arch to receive the weight and release groundwards. The decisive moment comes when the lateral arch and the first and second metatarsals are in contact with the floor and the medial arch prepares to release – this is the moment that the stabilizing muscles need to engage a millisecond earlier so that the medial arch widens but does not collapse and the lateral arch maintains contact while the whole foot stabilizes. This new coordination needs to be taught to the client and then practiced on a regular basis until the client's system has had time to own the new possibility and make it part of daily movement.

Meditation for Stabilizing the Valgus Foot

This meditation is done standing. Start standing with one hand on the wall or some kind of stabilizing surface. You are going to lift one foot off the ground and notice what happens in the supporting foot. What happens here will tend to be what happens in the one-leg-stance portion of the gait, which either sets the stage for core stability throughout the body or breaks it down.

The most important moment to notice is the moment that the stabilizing foot prepares to receive all of the body's weight. This is the increment of time before the other foot comes off the floor. What happens in the supporting foot as you prepare to take the other one off the floor? Do you feel a wobble? Do you see the tendons on the anterior face of the ankle pop up? If you have a valgus, collapsing foot, chances are that you will notice one or both of these phenomena.

Now, to play with the new option, start by standing in such a way that you can feel the forefoot engage with the floor. This may mean that you need to shift the weight of your upper body forward enough so that you can feel the pad of each toe come alive as it takes its share of the weight. Next, find the cuboid bone with your awareness and notice how it, and the whole lateral arch, rest floorward when you let the weight of your upper body come through it.

With full engagement of both forefoot and lateral arch with the floor, prepare to raise your other foot, while maintaining this contact. The second you feel a wobble, stop, go back, and find your contact of lateral arch and forefoot once again, until you can maintain the presence of metatarsals and lateral arch while the medial arch softens and drops. When this works, you will feel stable and solid in the whole foot as the other foot comes off the ground. You will probably also notice a sense of lifting and lengthening that occurs through the whole body, which we Rolfers call "finding the 'Line,'" and which happens as the major coordinative players of core stability come on line. A hand on the wall can lend support while you play with finding the stability of the foot.

Note: All images in this article are by the author.

Endnotes

1. Kapandji, I. A., *Physiology of the Joints: Volume 2 Lower Limb*. London: Churchill Livingstone-Elsevier, 1994 English edition.

2. Author's notes from a class with Hubert Godard.

3. Kapandji, I.A., op. cit.

4. Hamill, Joseph and Kathleen M Knutzen, *Bases Biomecânicas do Movimento Humano* (translated from English by Lilia Breternitz Ribeiro). Sao Paulo: Editora Manole Ltda, 1999.

5. Private conversation with Hubert Godard.

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