The plantar fascia and the Alexander Technique.

STRUCTURE

In podology and biomechanics, the plantar fascia is seen as part of a truss. It's upper part, the top of the roof, is where the foot articulates with the tibial and the fibular bones. Due to the fact that the lower part of the bony structure of the truss needs to be prevented from traction (bone is made to be compressed, not to be pulled) another structure takes over the function to hold the longitudinal foot arc. The lower part, the plantar fascia, is needed to protect the bones in heel strike, when standing and in the propulsion phase of walking.

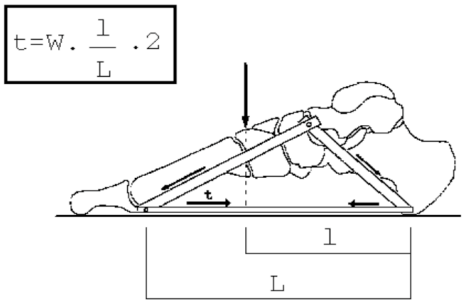

Figure 1: L is the length of the foot, l the length of the line between the calcaneal contact point and the vertical of the centre of mass. The longer the l/L ratio as in flat feet, the higher the traction in the plantar fascia. The tension in the fascia can be calculated using the formula above the image. t = tension, W = body weight.

FUNCTION

The same tissue strains twice. Due to its "wind axis" anatomy, the plantar fascia strains in heel strike as well as at the end of the propulsion phase. This way, the plantar fascia protects the bony structure of the foot both at heel strike and in the "toe off" phase and in standing.

Figure 2 heel strike (left) and the end of the propulsion phase (right).

When feet are "hollow," the plantar fascia cannot function as it should and specific problems occur. While walking, the foot has contact with the floor for a shorter period of time, resulting in higher upward reaction forces directed towards the tibia. In flat feet, on the contrary, the plantar fascia is overloaded and strained. The contact time is prolonged and the ground reaction forces are directed more forward towards the metatarsal bones. Prolonged strain in the plantar fascia leads to reaction of the calcaneal bone and eventually to heel spurs.

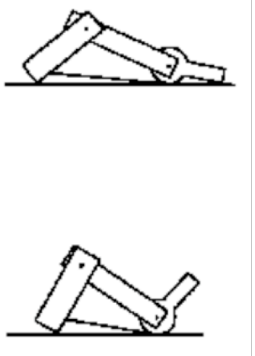

Figure 3: flat feet (top) and hollow (bottom).

IMPORTANCE OP PROPER FUNCTIONING OF THE ANKLE

The ankle has a specific function in standing and walking. Information from the calf muscles (endogenous data) are used in a procedure called *Smith Predictor* to control our balance. Human balance is often seen as functioning as an inverted pendulum. The plantar facia, part of the truss, has an important function in order to give the necessary freedom and information to the foot structure as a whole.

Figure 4: left, the ankle as the axis between the foot and the rest of the body. Calf muscles play an important role in the 'control' of our balance. Right, standing seen as an inverted pendulum.

When balance is compromised, vision (external, exogenous data) takes over to control the position of our centre of mass in relation to the position of our feet and to prevent us from falling.

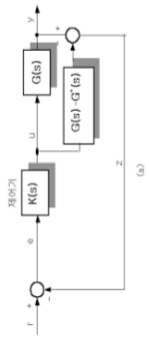

Figure 5: The lowest point represents the ankle/calf muscle unit. When the predicted result is not obtained using internal data, vision takes over to avoid falling down.

THE RELATION TO THE ALEXANDER TECHNIQUE

When structures underneath or above this ankle axis are in dysfunction, we loose our ability to use internal data regulating our balance, posture and movement. We strain our body, our vision becomes more important, our head changes its position in relation to the trunk...

Having free ankles (one of the cues used in the Alexander Technique) can be seen as priming good use in the feet as well as in the rest of the body. This good use results in steering the body with internal rather than external data.

When patients are permanently positioning themselves using external visual data, the result will be found in the feet as well as in the rest of the body.

CONCLUSIONS

Specific techniques are needed to return to the proper functioning. The Alexander Technique can provide the freedom above the ankle axis to solve problems underneath it, not only plantar fasciitis. The opposite is also true, the technique will influence the function of the feet and, in doing so, influence problems in the rest of the body. Reinstalling the Smith predictor function of the cerebellum needs specific procedures. We use Etudes (called Eye-Scans) and John Appleton's Posture Release Imagery to help patients regain their proper, endogenous steering as well as (mostly only for a short time) insoles.

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REFERENCE OF PICTURES AND FORMULA.

"Anatomy of the Foot and Ankle, descriptive, topographic, functional" by Shahan K. Sarrafian, J.B. Lippincott Company, Philadelphia, U.S.A., 1993, ISBN 0 397 51042 X.

Ian D. Loram, Peter J. Gawthrop and Martin Lakie, The frequency of human, manual adjustments in balancing an inverted pendulum is constrained by intrinsic physiological factors, J Physiol 577.1 (2006) pp 417–432

Yuri P. Ivanenkol, Nadia Dominic, Development of pendulum mechanism and kinematic coordination from the first unsupported steps in toddlers, Journal of Experimental Biology 207, 3797-3810 (2004)

R.C. Miall, D. J. Weir, D. M. Wolpert, J. F. Stein, Is the Cerebellum a Smith Predictor? Journal of Motor Behavior, 1993, Vol 25, No.3, 203-216

For more info:

www.bodyinpeace.be

www.bewegngspraktijk.be with some pages in English

www.doorvoeldbewegen.be with some video

www.posturereleaseimagery.org.

Body in Peace, originally published in Dutch, 2007, is being translated into English. Publication in 2010.

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