



Fuß- und Beinleiden
Haltungs- und Bewegungsanalyse

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Subfacial Edema due to Venous Incompetence demonstrated by MRI

Introduction

The venous blood of the leg will be transported back to the heart by a venous system. There the main function of over 80 % lies in the deep veins. The transport of the venous blood is only guaranteed by valvular sufficiency and by a sufficient effect of the venous pumps, to transport out of the leg all the blood, what was pumped into the leg via the arteries.

Is there an insufficiency either of the valves or of the pump, not all the venous blood will get out of the leg. This volume overloading creates the venous hypertension and a decrease of reabsorption. The drainage of the tissue is not sufficient, the tissue becomes swamped, what is the venous congestion (edema), beginning respectively to the importance of the deep veins in the area of the deep veins. It is the subfascial edema, as the beginning and the central problem of venous disease. It is responsible for the symptoms and it is the requirement for complications like thrombosis, eczema, ulcer or varices.

Aim

It has to be shown the substance of this pathophysiological view and the substratum of the palpation of the calf (heavyness, tension) and also the effect of a non-elastic compression bandage of the lower leg, as designed by Heinrich Fischer.

Material and Method

5 patients (2 men, 3 women, mean age 70,6) with the diagnosis „manifest subfascial venous insufficiency“ made by case history, inspection and palpation, were investigated before and after therapy with the non-elastic compression bandage of the lower leg with an MRI-T2-weighted examination with fat saturation. T2-weighting means high signal intensity of all water protons. All other tissues demonstrate a low intensity in T2 weighted images. Only fat would show a high intensity – that is why we used fat saturation. When only water spins demonstrate a high intensity it should be possible to measure the water content of the tissue when we count all voxels above a threshold.

In MR imaging the signal is not standardized as in CT. The MR-signal depends of the person in the scanner, the receiving coil, the position of the coil and the patient in relation to the magnet and so on. In order to define threshold values we normalized the patient's signal to the soleus muscle. We

measured the mean signal intensity and the standard deviation in a region of interest in the soleus muscle and defined the lower point of our threshold as the mean signal in the region of interest minus one standard deviation and the upper point of the threshold as infinite. With a special software we can count the voxels within the threshold and the sum of all voxels we define as the water content of the calf.

(The radiological investigation is made by Prof. R. Janka, Radiologisches Institut der Universität Erlangen, Germany.)

The Fischer bandage is a zinc paste bandage with inelastic material precisely modeled with pressure on the lower leg. In combination with walking it creates a very high working pressure of at least much more than 50 mmHg. This therapy took place up to the palpable congestion of the calf is removed.

Results

With this MRI-examination before and after therapy with inelastic bandages a reduction of the water content of the calf could be demonstrated. It is a reduction of the edema.

This corresponds to the symptoms, the inspection and the palpation.

Conclusion

Due to the anatomical and physiological construction of the venous system there is a very high importance of the deep veins in the subfascial region.

But as the venous transport is organized like a system always all structures of the leg will be involved by an insufficiency.

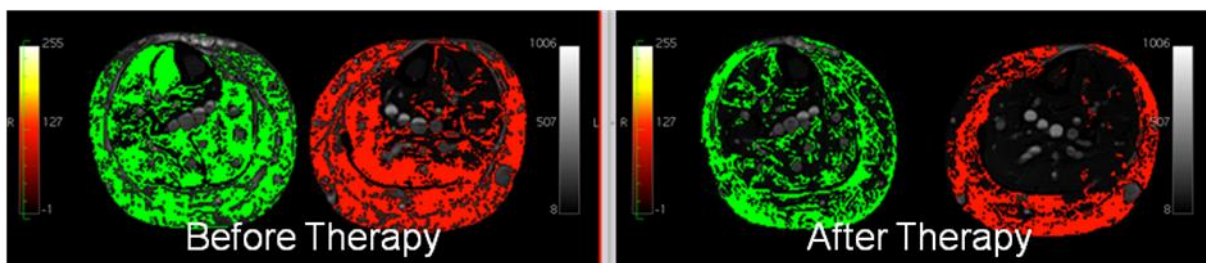
Logically an insufficiency of the system should begin in the region of the deep veins.

This idea would correspond to the symptoms of the patient like heaviness and tension what would be the tension of the fascia by the overloading with liquid by the subfascial congestion.

It also would correspond to the palpable congestion in the depth of the calf.

So I suppose a subfascial edema as the pathophysiological correlate of venous disease.

I suppose that the edema, that has been demonstrated in this MR-investigation is the pathophysiological substratum of what Browse called „The painfull deep-vein Syndrom“ and also the substratum of what Partsch tried to differentiate between „The painfull deep-vein Syndrom and the „Pseudothrombophlebitis“. The subfascial edema is the correlate of what Petter described as the symptoms of the deep-vein-insufficiency. Already in the early 1970 Haid and Partsch documented an improvement of the subfascial lymphdrainage by patients with compression therapy after thrombosis by szintigraphic investigations. I would say that they demonstrated the subfascial edema by an improvement of the subfascial lymphdrainage. Because the subfascial region had been swamped by a venous congestion.



MRI - Transversal cut of the calves, green right leg, red left leg before an after therapy with a non-elastic compression bandage on the lower leg.

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Dr. Helmuth Haid, the important promotor for the Fischer – Technique, dedicated to his 100. birthday.