Case History and Successful Therapy of a Toe Walking 23-Years Old Man

D. Pomarino, Alexandra Kühl,Frederike Kühl, Andrea Pomarino

Summary

A young, 23-years old male introduced himself to the practice, declaring he had been persistently toe walking for all of his life. There had been no therapy whatsoever. During adolescence, the patient had intermittently suffered severe pain in the lumbar portion of the spine. Neurological and myogenic causes for his toe walking could be excluded. Eventually, he was administered a pair of Pomarino pyramid insoles, which was well received.

For the first time in his life, his gait pattern resembled those of typically developing people and walking was no longer associated with pain. By way of an electromyogram (EMG) of the musculus tibialis anterior, the effectiveness of pyramid insoles could be indicated. This case is nothing less than the first adult toe walker who has been cured through pyramid insoles.

Fig. 1, Photo-scan of the man's feet at the first day in practice.

Fig. 2, Photo-scan of the patient's feet after three months of therapy according to Pomarino™

Introduction

Some children who toe walk reach their climax around the age of 2. A diagnosis of idiopathic toe walking is reached by excluding other deviations, such as central and neuromuscular diseases, the infantile cerebral palsy, or myopathies and neuropathies. Persisting toe walking can lead to secondary alterations of the build of the skeleton. There exist also indications according to which toe walking increases the risk of a herniated vertebral disk, deformations of feet, limitations of movement of the passive ankles, and contractions of the hip bend. Studies examining possible causes of idiopathic toe walking suggest that it may be caused by pneumonia at an earlier age, hip dysplasia, and a genetic predisposition (1-3).

Case History

A young, 23-years old male introduced himself to the practice, declaring he had been persistently toe walking for all of his life. Besides toe walking, his motor skills developed normal.
But he felt inhibited by his toe walking habit as normal walking was not possible without considerable efforts. Because of this abnormality, other children his age were picking on him, resulting in severe mental strain. Ready-made shoes did not fit due to the widened forefeet.

Through bodily examinations and electromyo-graphy, a spastic condition could be excluded. A cause for his toe walking has however not been elicited. At the age of 17, first signs of intermitting pains in the lumbar portions of the spine occurred. A body check indicated normal nutritional status and a generally good bodily condition, but also bilateral and symmetrical toe walking.

There was also a limitation of the passive ankles' dorsiflexion: dorsi-flexion/plantarflexion in knee bend position was on the right side 8°/0°/50° and on the left side 10°/0°/50°; dorsiflexion/plantarflexion in normal position was on the right side 0°/0°/50°, on the left side 8°/0°/50°. No limitations of movement were apparent in the abduction of the hip. All measurements of the range of motion have been carried out according to the neutral-0-method. At a Schober sign of 11 cm, the range of movement of the lumbar portion of the spine had to be rated insufficient.

After that, for the treatment of persisting toe walking, the patient obtained a pair of Pomarino pyramid insoles. At the forefoot area, these insoles have supporting elements that are tailored according to the size of the foot. They encourage the foot to regain its natural position. This changes the entire build of the foot, starting from muscles and tendons, up to the bones and joints (4).

Already after three weeks of permanent application, toe walking was receding. Three months of therapy proved successful as gait pattern normalized and cornea developed at the heels (Fig. 1 and 2).

Another sign of betterment was indicated via electromyogram. While the first EMG of the musculus tibialis anterior was done for the sake of evaluating the transmission line of peripheral nerves, the non-invasive EMG-evaluation was made up of two different measurements: the first take was made togain data about the transmission lines of peripheral nerves while muscles were completely relaxed, such as in a lying or sitting position.

Comparably, the transmis-sion lines were now examined while the patient's muscles had been activated. The second measurement was undertaken accordingly; only the position of relaxation had been modified. Here, the first take was made while the patient was standing and had his heels touching the floor.

Interestingly, the transmission line of the musculus tibialis anterior has been extraordinarily high in terms of measurements before the therapy and when the patient was standing: max values were 251mV on the left side and 506mV on the right side (Fig. 3 and 4).

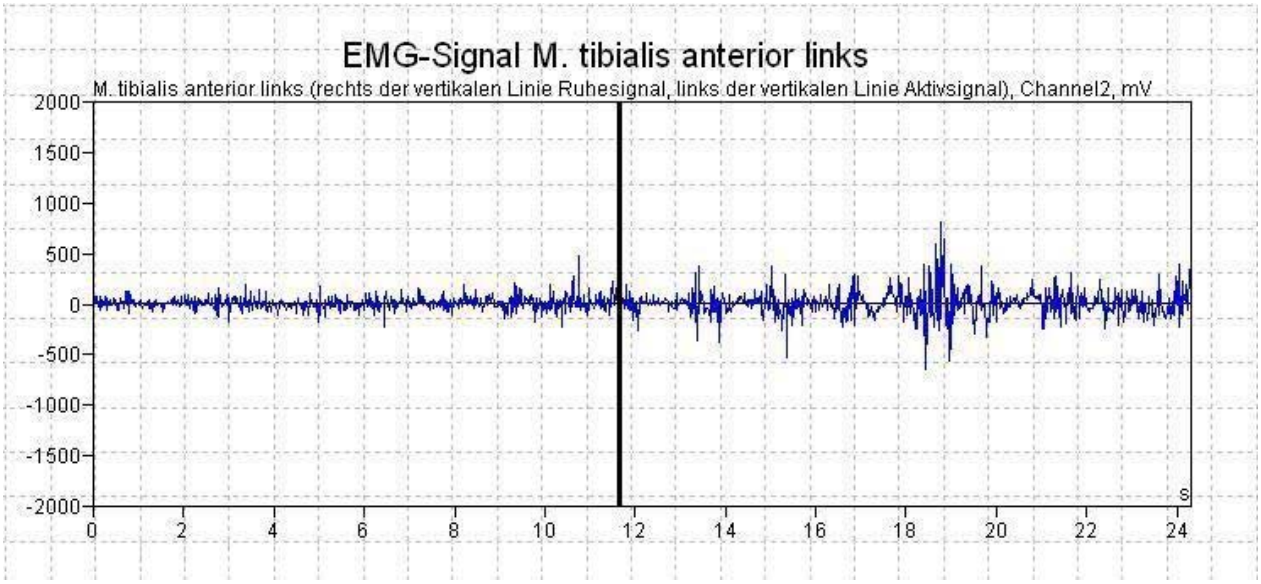

***Fig. 3**, EMG-signal (posture and gait) before the therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, left; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

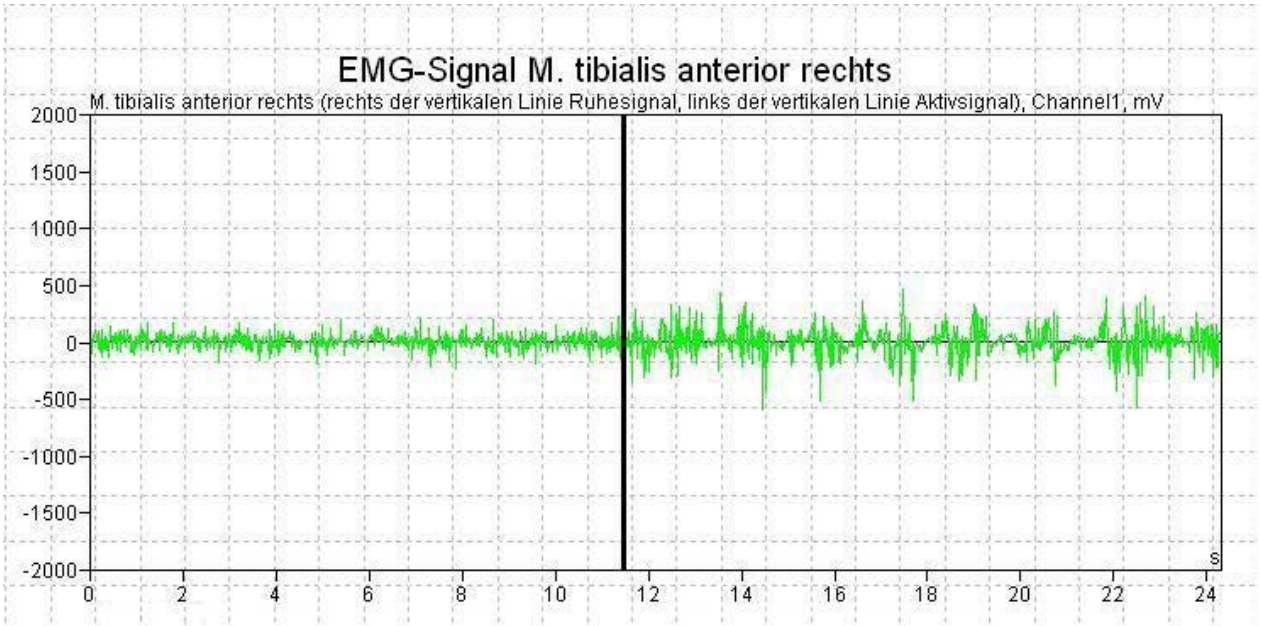

***Fig. 4**, EMG-signal (posture and gait) before the therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, right; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

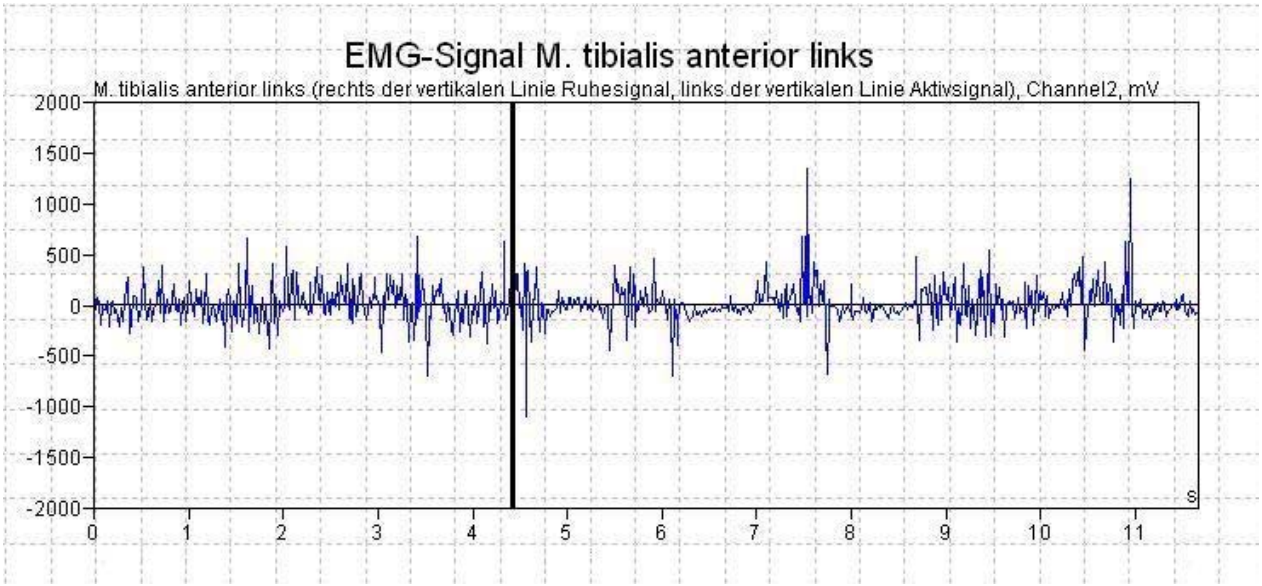

***Fig. 5**, EMG-signal (posture and gait) after three weeks of therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, left; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

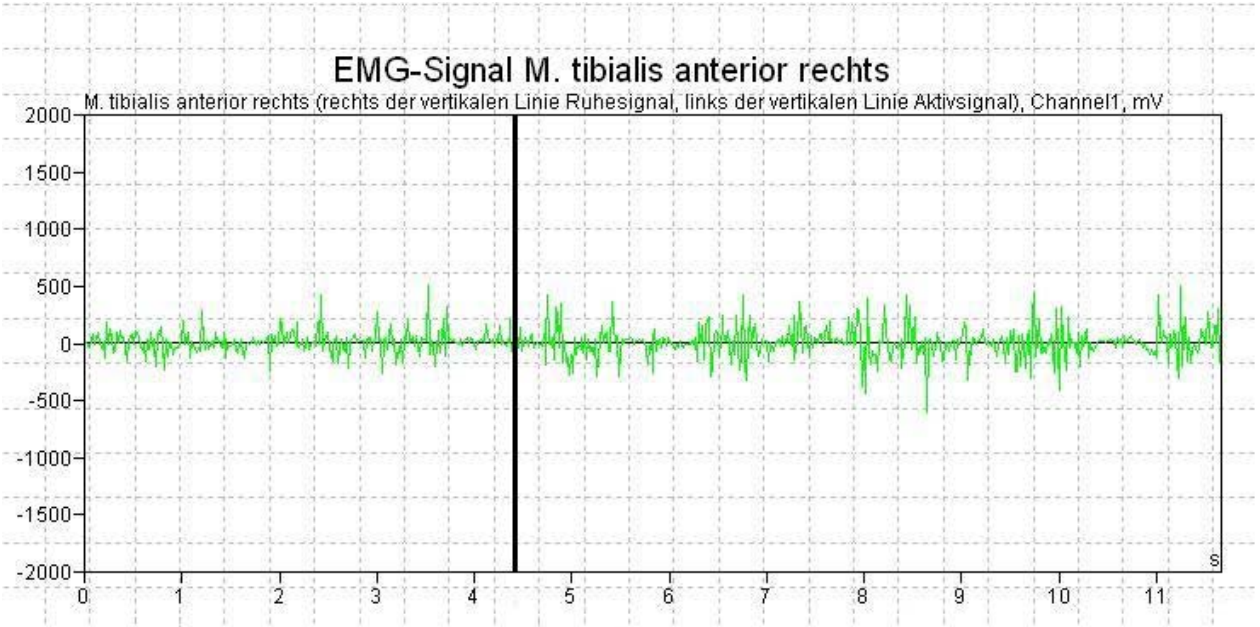

***Fig. 6**, EMG-signal (posture and gait) after three weeks of therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, right; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

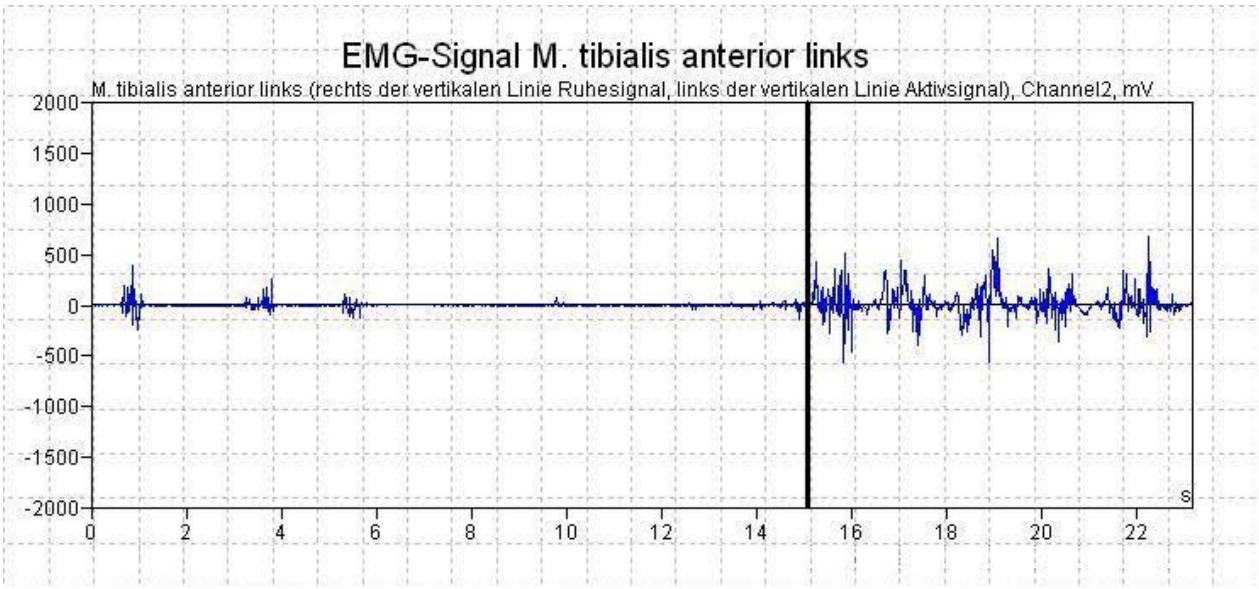

***Fig. 7**, EMG-signal (posture and gait) after six weeks of therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, left; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

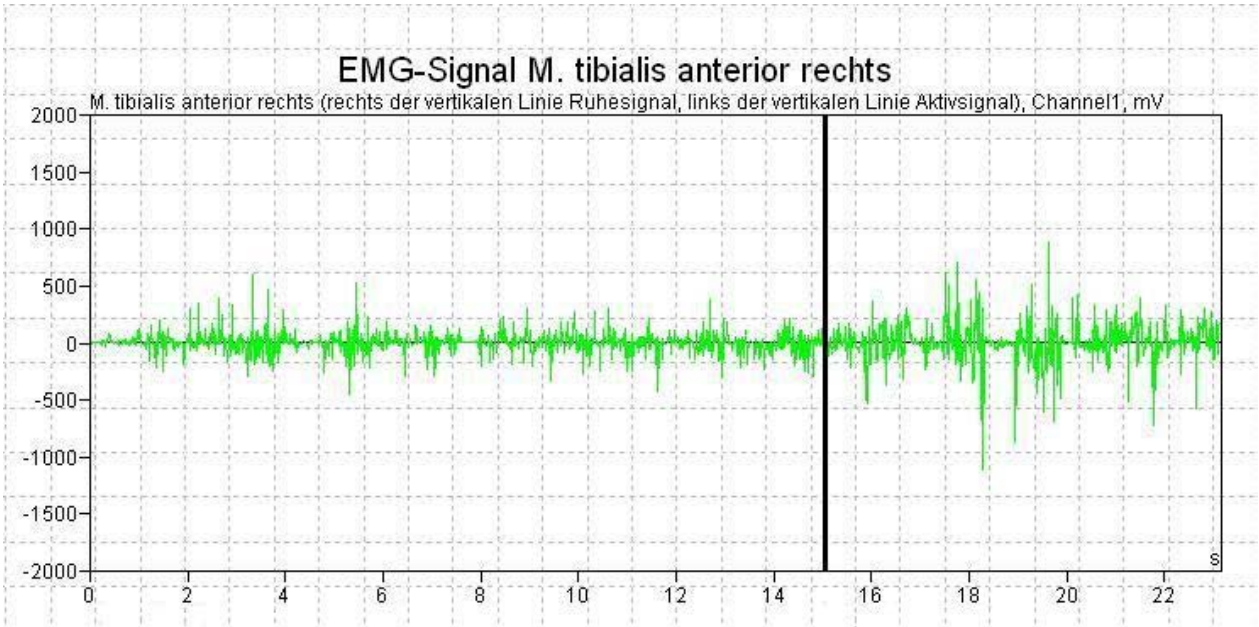

***Fig. 8**, EMG-signal (posture and gait) after six weeks of therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, right; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

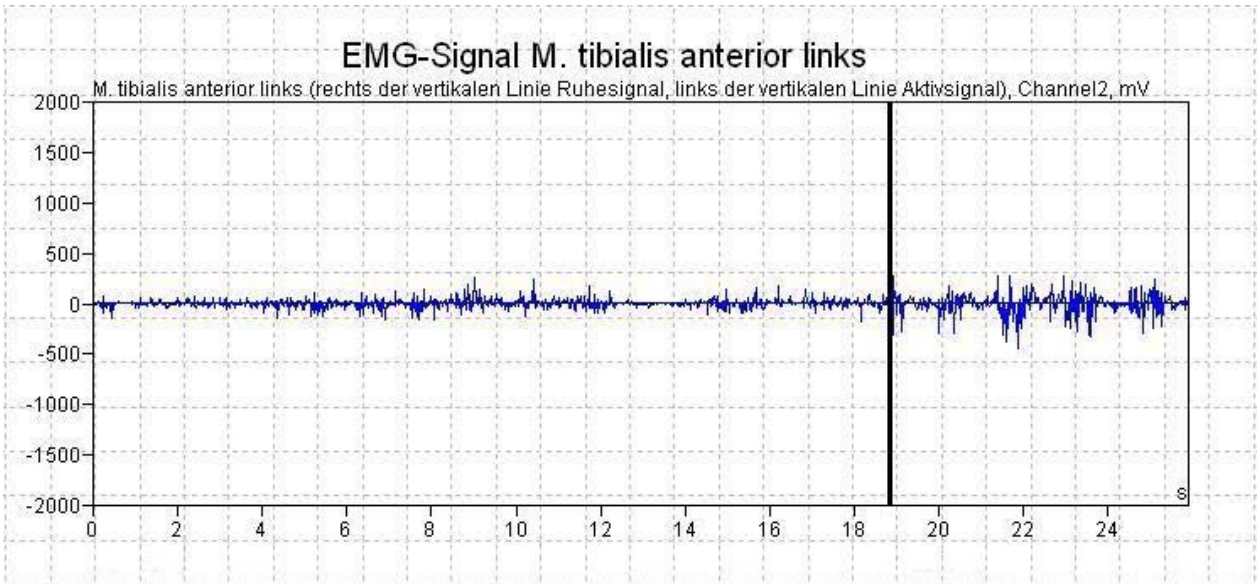

***Fig. 9**, EMG-signal (posture and gait) after ten weeks of therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, left; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

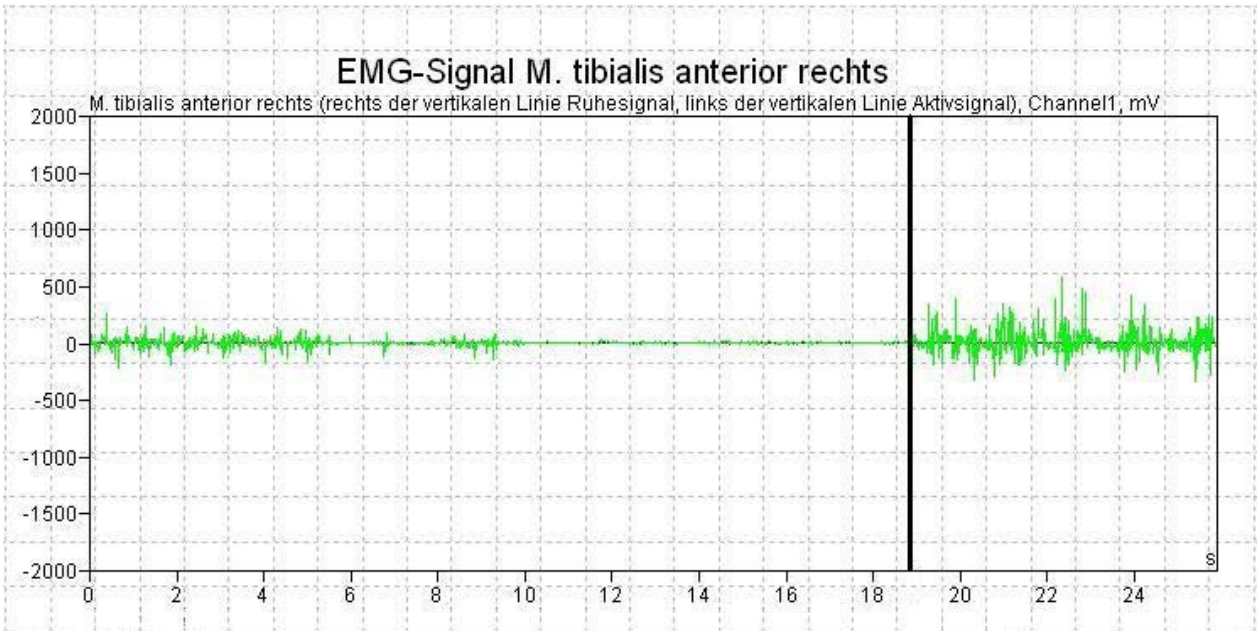

***Fig. 10**, EMG-signal (posture and gait) after ten weeks of therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, right; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

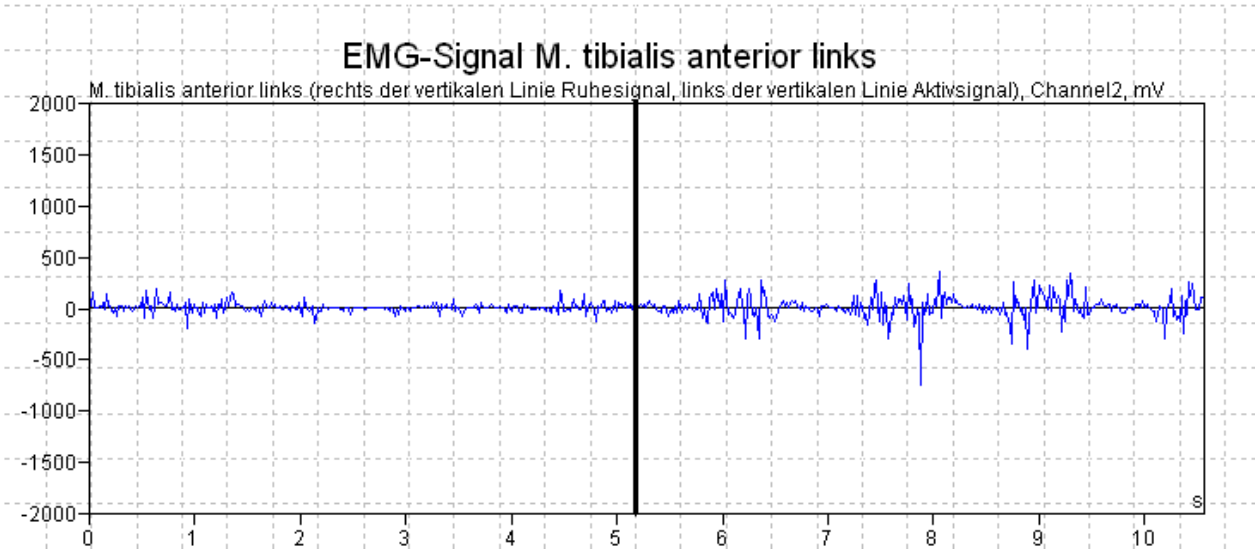

***Fig. 11**, EMG-signal (posture and gait) after three months of therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, left; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

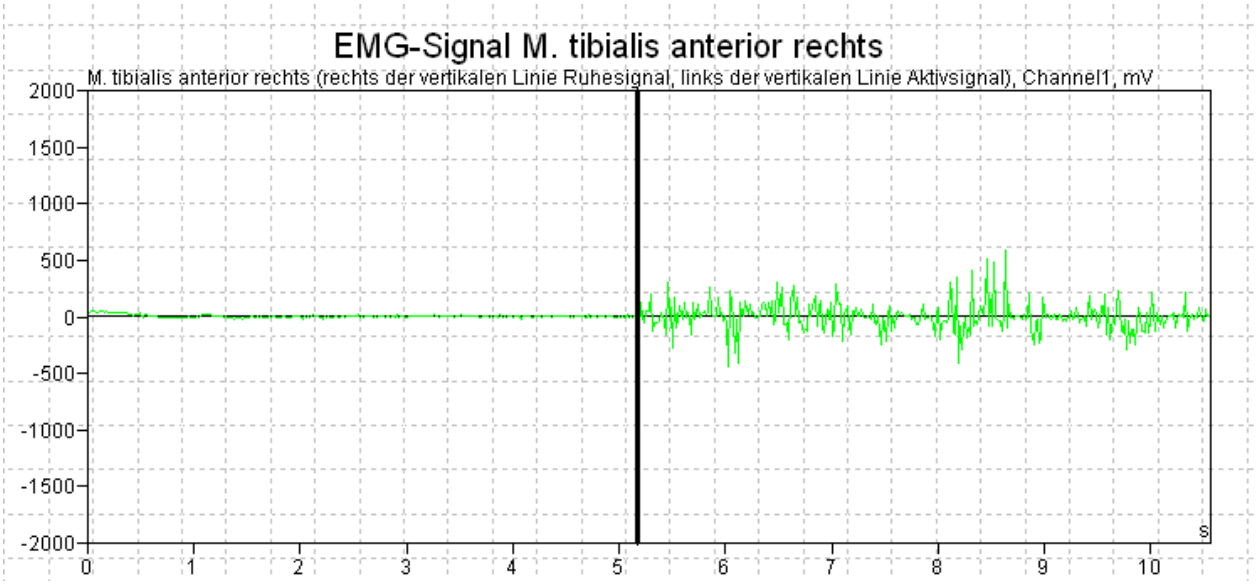

***Fig. 12**, EMG-signal (posture and gait) after three months of therapy with pyramid insoles by Pomarino™; musculus tibialis anterior, right; y-axis = voltage in mille volt (mV); x-axis = time in seconds (s)*

The following examinations were made every three weeks during the application of the therapy and they indicate an activation of the transmission line of the musculus tibialis anterior on two sides, standing; the right side of the lower leg shows a much more intensified activation, though.
In the beginning, and in contrast to the first measurement, higher maximal values have been reached (663 mV, left; 509 mV, right).
It followed a regulation of the transmission line, resulting in the reduction of maximal values after ten weeks of therapy (244 mV, left; 251 mV, right) (Fig. 5-12).

A complete regulation has been accomplished after the three months the therapy lasted (Fig. 12). The maximal value of the left musculus tibialis anterior has by then reached a low of 190 mV (Fig.11).

Discussion

So far, relevant literature has not yet mentioned adult patients with idiopathic toe walking. This examination of a toe walker beyond the usual age of infancy has shown the effectiveness of therapy with pyramid insoles by Pomarino™. In the early stage of the therapy, the patient complained temporarily about an insecure feeling during walking with insoles.
But three weeks later, gait patterns and the ability to walk longer distances. A succeeding check confirmed this contention and distinct wearing marks around the heels of the insoles could be discerned. Additionally, the generation of cornea in the hindfoot and the emergence of wrinkles at the forefoot referred to the use of the entire foot (Fig. 1 and 2).

Also, the ranges of mobility of the passive ankles with and without knee bend (dorsiflexion/plantarflexion according to neutral-0-method) has been significantly improved (10°/0°/50°). The patient felt more secure while standing and walking.
To sum, EMG has verified the effectiveness of pyramid insoles by Pomarino™ regarding to the relevant muscles, indicated by the initially higher values of the transmission line of the musculus tibialis anterior that were being reduced in the course of the therapy.
The insoles forced the patient to have his heels touch the ground, irritating the peripheral nerves and resulting in the higher values. Because of the permanent stretching of the muscles, the musculus tibialis anterior simply atrophied.
Also, standing on the entire foot ‘trained’ the flagged muscles of the toe walker, thus normalizing the transmission line.

This observation suggests that in a few more months the musculus tibialis anterior will have been regulated and the transmission line will have been normalized, making the treatment with pyramid insoles obsolete.

Through the application of the EMG, the effectiveness of the therapy to cure adult toe walking has thus been verified.

Literature

1. Pomarino D, Bernhard MK (2006): Behandlung des idiopathischen Zehenspitzenganges mit Pyramideneinlagen. päd 12, 82–88
2. Pomarino D (2004): Der Fuß – Fundament des Körpers. Physiotherapie med 4, 23–30
3. Korinthenberg R (2004): Differenzialdiagnose des Zehenganges. Kinder- und Jugendarzt 35, 21–29
4. Pomarino D (2003): Pyramideneinlagen nach Pomarino. Orthopädietechnik 11, 810–813

David Pomarino · Physio Therapie Zentrum · Forschung und Entwicklung · Orthopädietechnik · Kinderorthopädie

Eulenkrugstrasse / Wiesenhöfen 55-57 · 22359 Hamburg · Germany

Tel.: +49 40 87 88 50 71 · Fax: +49 40 87 88 50 72 · Email: info@ptz-pomarino.de . Internet: www.ptz-pomarino.de