

KENDO HEEL DEMYSTIFIED: DIGRESSIONS ON ACUMAGNETIC TENSEGRITY

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**“What is known is not said, and what is said is not known.”
Issai Chozan, Neko no Myojutsu (*The Cat's Eerie Skills*, 1727)**

INTRODUCTION

Grueling kendo practice in the 40's brought me enlightenment mixed with anguish. I have been through sports injuries such as the 'shoulder impingement', ECU tendinitis 'tennis elbow', 'shin splints', heel pain (or plantar fasciitis, PF) and conquer them all. PF, for example, persisted for about six months and despite the initial denial, lack of knowledge and poor prognosis I got inspired to find an effective treatment myself. After my left heel bad habits were eradicated, I've engaged traditional acupuncture with magnets and I managed completely to dissolve the heel pain for ~30 days treatment. The struggle with PF made me attentive to all kendoka in different dojos suffering the same. I believe the heel pain in kendo should not be considered and treated as a simple biomechanical trauma despite similarities described in other sports. The kendo heel pain has much deeper implication in the process of kendo internalization. In support of my observations and belief I have presented herein a few pieces of information connecting some distant fields of thought including history, science, traditional contemporary and future medicine, as well as classic texts on internal martial art. With all that I would hope to cross over the boundary of the unspoken in kendo and promote awareness across dojos to all who are approaching 40 or older, love kendo and are willing to make it a life-time experiment.

HEEL INJURY BACKGROUND

It has been estimated that over two million people each year receive treatment for heel pain (i.e., plantar fasciitis (PF)), which affects as much as 10% of the population during the course of a life-time [1,2]. Heel pain has been reported to occur

in 15% of all adult complaints requiring a visit to a podiatrist and is prevalent in both the athletic and non-athletic populations [3,4]. Heel pain can affect anyone from the age of 8 to 80, but is generally observed in those over 40 years of age and does not seem to be gender specific [5].

PF seems to be caused by a painful partial tearing of the plantar fascia which connects the area of the foot near the toes with the heel (Figure 1). This partial tear usually occurs at its attachment into the heel bone (calcaneus, Fig. 1A) which results in either a heel spur forming (from the injured bone attempting to heal itself) or in PF. The term PF is derived from plantar which refers to the bottom of the foot and fascia which is a type of dense fibrous connective tissue. The "itis" is a suffix which means inflammation. Latest studies show that in many cases of PF there really is no inflammation, but rather avascularity (loss of blood circulation). Because the fascia has a poor blood supply, it often becomes a slow-healing, chronic condition. In chronic cases, the injury can progress to a bone spur where the fascia attaches to the heel. While it is not the bone spur that causes the pain (a common misconception), the irritation of the fascial tissue by the spur can be quite painful.

Although the exact mechanism of the PF is still debated, it is predominantly seen in runners (1) with high arches, (2) who over-pronate and/or (3) who exhibit muscular imbalances of the lower leg (tight calves and/or weak shin muscles). Approximately 10% of all runners develop PF. Among them 7% are females and 25% are males. If a sufferer has heel pain and is also female, overweight, above the age

FIG 1. AREAS OF HEEL PAIN EXPERIENCED BY OVER-PRONATORS



that requires more than 6 hours a day of standing. If heel pain began concurrently with a change or increase in activity, or an increase in weight, then it can be considered more evidence of PF.

ANATOMY OF THE PLANTAR FASCIA

The plantar fascia is a broad structure that spans between the medial calcaneal tubercle and the proximal phalanges of the toes. There is still some debate as to whether it is deep fascia or an aponeurosis. The Dorland's Medical Dictionary defines an aponeurosis as: (i) a white, flattened or ribbon-like tendinous expansion, serving mainly to connect a muscle with the parts that it moves, (ii) a term formerly applied to certain fasciae. Further, it defines the plantar aponeurosis as: bands of fibrous tissue radiating toward the bases of the toes from the medial process of the tuber calcanei; also called the plantar fascia. For the purpose of this thesis, however, the term plantar fascia will be used to link to the clinical condition PF. The plantar fascia is made up of predominantly longitudinally oriented collagen fibers. There are three distinct structural components: the medial component, the central component, and the lateral component (Figure 2). The central component is the largest and most prominent.

of 30, and just started step aerobics after years at a desk job, you can be pretty sure she has PF. 87% of all PF sufferers are above age of 30. 74% are overweight. 72% are female. 43% have a job

structural components: the medial component, the central component, and the lateral component (Figure 2). The central component is the largest and most prominent.

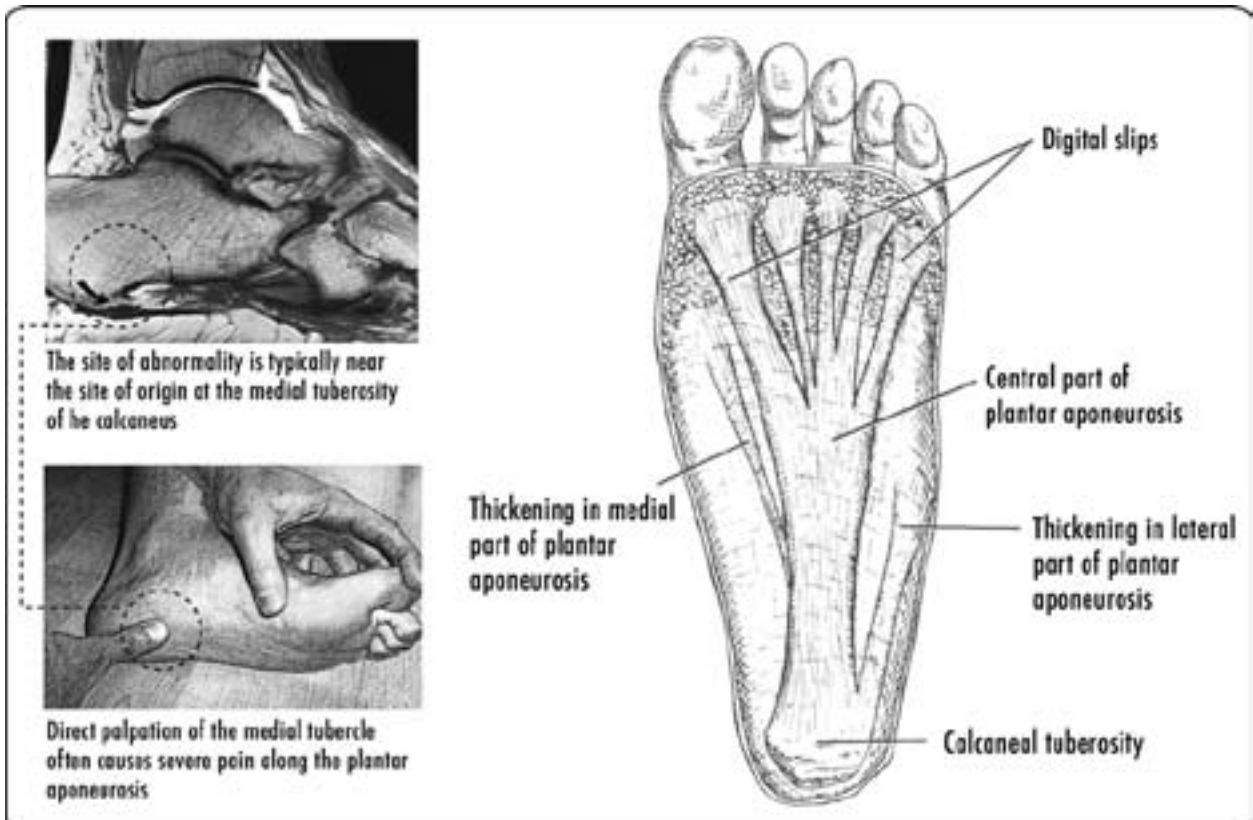


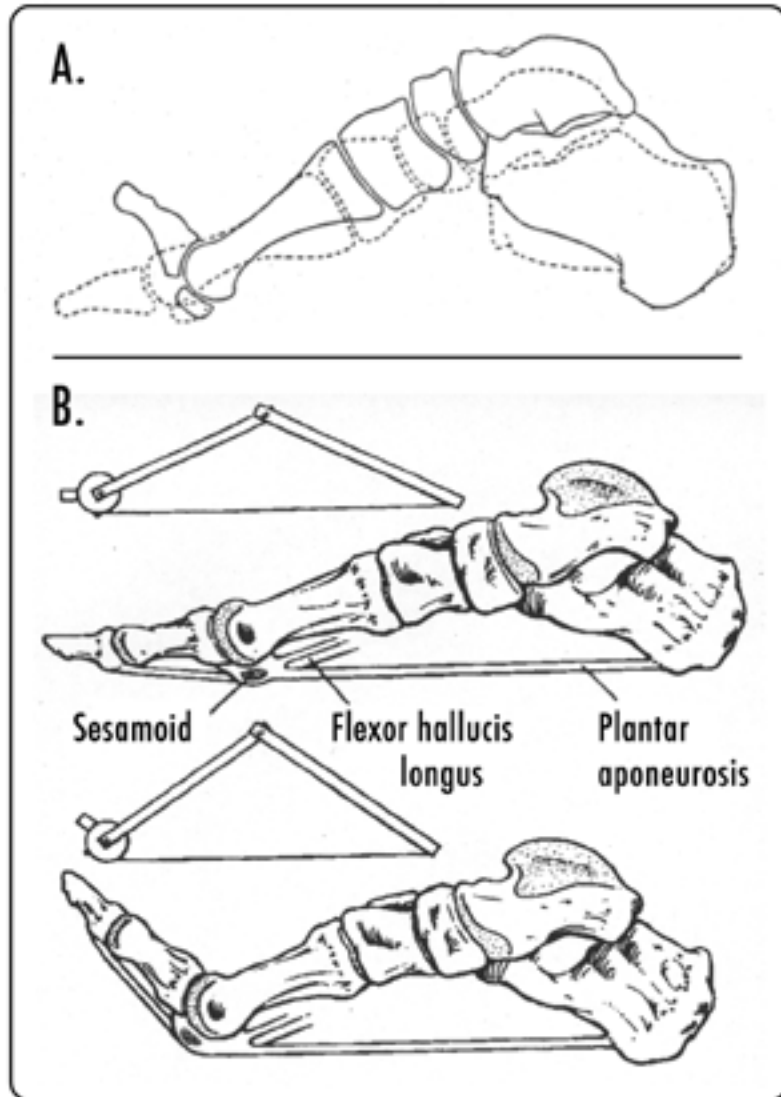
FIG 2 ANATOMICAL DIAGRAMS ILLUSTRATING THE COMPONENTS OF THE PLANTAR FASCIA

In younger people the plantar fascia is also intimately related to the Achilles tendon, with a continuous fascial connection between the two from the distal aspect of the Achilles to the origin of the plantar fascia at the calcaneal tubercle. However, the continuity of this connection decreases with age to a point that in the elderly there are few, if any connecting fibers. There are also distinct attachments of the plantar fascia and the Achilles tendon to the calcaneus so the two do not directly impact on each other. Nevertheless, there is an indirect relationship whereby if the toes are dorsiflexed, the plantar fascia tightens via the windlass mechanism. If a tensile force is then generated in the Achilles tendon it will increase tensile strain in the plantar fascia. Clinically, this relationship has been used as a basis for treatment for PF, with stretches and night stretch splinting being applied to the gastrocnemius/soleus muscle unit.

BIOMECHANICS OF THE PLANTAR FASCIA

The plantar fascia contributes to support of the arch of the foot by acting as a tie-rod, where it undergoes tension when the foot bears weight. One biomechanical model estimated it carries as much as 14% of the total load of the foot. In an experiment using cadavers, it was found that failure of the plantar fascia averaged at loads of 1189 ± 244 Newtons (121 ± 24 Kg/ 55 ± 11 Lb). Interestingly, failure most often occurred at the proximal attachment to the calcaneus, which is consistent with the usual location of symptoms (i.e. in plantar fasciitis, PF). Complete rupture or surgical release of the plantar fascia leads to a decrease in arch stiffness and a significant collapse of the longitudinal arch of the foot. By modeling it was predicted such conditions would result in a 17% increase in vertical displacement and a 15% increase in horizontal elongation of the foot when it was loaded at 683 Newtons (69.64 Kg/ 31.59 Lb). Surgical release also significantly increases both stress in the plantar ligaments and plantar pressures under the metatarsal heads. Although most of the figures mentioned above are from either cadaver studies or investigations using models, they highlight the relatively large load the plantar fascia is subjected to while contributing to the structural integrity of the foot.

FIG 3. THE EFFECT OF DORSIFLEXING THE TOES ON ARCH HEIGHT (A) THE WINDLASS MECHANISM (B)



The plantar fascia also has an important role in dynamic function during gait. It was found the plantar fascia continuously elongated during the contact phase of gait. It went through rapid elongation before and immediately after mid-stance, reaching a maximum of 9% to 12% elongation between mid-stance and toe-off. During this phase the plantar fascia behaves like a spring, which may assist in conserving energy. In addition, the plantar fascia has a critical role in normal mechanical function of the foot, contributing to the “windlass mechanism”. When the toes are dorsiflexed in the propulsive phase of gait, the plantar fascia becomes tense, resulting in elevation of the longitudinal arch and shortening of the foot (Figure 3A). One can likened this mechanism to a cable being wound around the drum of a windlass (Figure 3B); the plantar fascia being the cable, the metatarsal head the drum, and the handle, the proximal phalanx. Therefore, the plantar fascia has a number of roles, the most important of these including supporting the arch of the foot and contributing to the windlass mechanism.

RATIONALE

Why is effective functioning of the left heel important for kendo? Why do we over-pronate? Why should we be attentive to the left foot and its involvement in the unity of mind, spirit and technique?

The vital role of the left leg can be explained from basically two different perspectives. The first one is biomechanical in nature (For details: Kendo World V2 No2, 2003 pp42-48 by Arima Saburo) and relates to the role, power, geometry and muscle involvement of the left foot to propel forward movement in enabling fumi-komi action, which all together precipitate in execution of a valid strike (yuko datotsu). From biomechanical perspective using modern electrophysiology we can confirm how distribution of weight from the right to the left feet and tension of calf muscle of the left leg is crucial for the attacking speed. This approach explains some possible reason why we over-pronate and provoke heel injury. To avoid constant tension on the left one could move its weight on the front thus lifting the left heel and keeping the plantar fascia. But it does not provide guidance for treatment and pain management.

A second approach can be defined as tensegrous in which biomechanics is only part of a global architecture. A typical tensegrity system is characterized by a continuous tensional network (tendons) supported by a discontinuous set of compressive elements (struts). The human body as a whole and various parts, including the interiors of all cells

ly stronger. This is the way atoms behave.

In kendo we witness the tensegrous behavior of the body. The following short paragraphs showed how experience in the art have perceived the interaction and mutual dependence of the left heel with other systems pivotal for the integrity of the body, mind and technique:

“It is vital to remain calm. In other words, are you able to remain totally steadfast in the presence of your opponent? To gauge this, I always observe the examinee left hand and foot. There is a teaching in kendo to 'breathe through your heel'.”

[Kendo World V2 No4, 2004 pp22-25 by Arimitsu Masaaki, Hanshi 8th dan]

“Another basic element in achieving sae is correct kamae. If you back or the back of your knee is bent, it will be impossible to make successful strike with sae. The left leg, left heel, left knee, and the left hand must be stabilized to maintain a correct posture.”

[Kendo World V2 No3, 2004 pp34-37 by Kobayashi Hideo, Hanshi 8th dan]

“...when falling prey to the opponent's seme or pressure, your breathing become uncontrolled, and your left foot starts to float. The left leg and breathing are intricately connected.”

[Kendo World V1 No3, 2002 pp48-51 by Ishihara Katsutoshi, Hanshi 8th dan]

“...to be able to capitalize on taking sen and react appropriately, correct positioning of your left hand and

TENSEGRITY EXAMPLES	CHARACTERISTICS
BOHR'S ATOMS	Electrostatic forces cohere the components while rotational momentum keeps them apart.
LIVING CELLS	Using floating-compression models as primary analogy, many cells of living tissue are fitting the tensegrity model.
HUMAN BODY	The muscles, tendons and ligaments are the purely tensile components which bind together the bones and cartilage.
EARTH	Without the presence of gravity, the spinning of Earth on its axis would cause it to disintegrate, likewise for most of the other large members of the solar system.
SOLAR SYSTEM	Gravity coheres the components while rotational momentum keeps them apart.

can be visualized as tensegrity systems.

Tensegrity systems are synergetic - a behavior of the whole unpredicted by the behavior of the parts. Old stone-age columns and lintels are energetic and only interact locally with whole buildings. The whole tensegrity-icosahedron system, when loaded oppositely at two diametric points, contracts symmetrically, and because it contracts symmetrically, its parts get symmetrically closer to one another; therefore, gravity increases as of the second power, and the whole system gets uniform-

use of your left foot in seme is of a vital importance.”

[Kendo World V2 No2, 2003 pp29-32 by Harada Genji, Hanshi 8th dan]

“The men of old breathed clear down to their heels.”

Chuang Tzu (399 - 295 B.C.)

The link between psychological state and breathing is well documented and supported by scientific research. When we are in a calm psychologi

cal state our breathing is, of course, controlled and regular. It also tends to be deep abdominal breathing. When we are stressed and panicked ('falling prey') our breathing will tend to 'rise' becoming shallow, rapid and uncontrolled. So does our left heel. This idea of stability being 'low' to the 'heels' ("calm down") and excitement being 'high' ("temper rises") is present at the above, but the relationship between psyche and breathing is tensegrous. Breathing is affected by psychological state but can also effect a change in psychological state. Although breathing usually functions unconsciously it is one of the few body functions that can be adjusted consciously resulting in the concept of breath control. This has long been utilized in the East where meditation technique usually attempts to replicate the breathing pattern of calmness, i.e. abdominal breathing 'down to the heels', to attain a calm psychological state.

Therefore, as breath control seemed to be an important element in many other ascetic training methods, it seemed it might be equally important in kendo. The issue of 'breathing down to our heels' reveal much not only about technique, the so-called physical aspect of the art, but also about the psychological content needed to attain the very highest levels. At the same time, if, through the proper heel position and engagement, its connection to the breath control, technique would function simultaneously on both physical and psychological levels. This would shed light, in very concrete terms, on the concept of mind-body tensegrity, and lend credence to the kendo claims to be something more than physical exercise. At the same time will lend credence to my claim that heel injury is more than physical experience.

MODUS OPERANDI

At the time when my heel pain was at its maximum a friend of mine who I accepted as a kendo tutor pointed out that my left foot is too high. He had excellent teachers in his past and was able not only to learn but develop a sharp eye for ba-

sic kendo which gave him the ability to instruct effectively. Thanks to his instructions I was able already to correct a deficiency of my kamae that was causing me for years 'shin splint' on the left leg. In general he pointed out that skills in kendo never develop alone or too early from each other. Skills are formed gradually and most importantly synchronistic manner. For example, it is improbable to have a good strike if the foot work was not developed or vice versa. It seemed that I was at the point to notice a simple thing about my kamae (the behavior of my left heel) and consequently to improve it.

I got excited about the discovery that my left heel brings unexpected stability and calm during ji-geiko so I decided to check for the left heel behavior of high ranking sensei during their fumi-komi. I dig out of my collection a DVD with the greatest kendo masters of the Showa Era ("Showa no Kengo"). The documentary included matches and demonstrations from 9th and 10th dans such as Nakakura Kiyoshi, Takano Sasaburo, Mori Torao, Nyui Yoshihiro and Mochida Seiji. I was particularly impressed by Mochida Moriiji, a 10th dan performing geiko at the age of 76, who's recordings at Noma dojo I have seen before but never paid attention to the heel detail. His kamae was simply perfect. His left heel was so calm and never lifted more than a centimeter up from the ground. So I've just become aware of the elements of the basic Kendo Mochida Sensei was learning for 50 years.

"In the way of learning kendo, you have to train hard to learn the basic skills. Many people think that they have already understood the basic skills, but this is totally wrong. During a long period of kendo training, people easily forget what the basic skills are. It took 50 years to learn basic skills. And then I started real kendo training because I tried to do Kendo with my mind.

People start losing good ability of legs, when they turn 60. I started to train to use my mind correctly to support physical disadvantages.

When I turned 70, I started losing strength in other parts of my body too. Then, I trained to control my mind to stay calm.

At 80, I know how to control my mind. But still I "think" sometimes. Now I am training myself not to think."

Mochida Moriiji, 10th dan Hanshi (1885-1974)

WHAT IS THE BASIC OF OUR POSTURE, LEFT HEEL POSITION AND IMPLEMENTATION?

KAMAE (POSITIONS OF POSTURE)

Kamae actually means 'Posture' but in context is more clearly expressed as



'position' since it refers specifically to the position in which the Shinai is held. The height of blade is divided into three levels or Dan (steps) and designated as Jodan (high step), Chudan (middle step), and Gedan (low step). 'No-kamae' means 'posture of', but the short form as above is general.

SEIGAN-NO-KAMAE (NATURAL POSTURE)

Seigan (natural step) is another name for Chudan. The right foot is advanced with the knee slightly bent; the left leg is straight with the heel clear of the floor.

SHINTAI DOSA (BASIC FOOTWORK)

If it is understood that Shisei (fundamental posture) is the foundation of all techniques it will be equally clear that the only way to preserve this position is by footwork. All footwork is designed to preserve Shisei and generally speaking to maintain the advanced position of the right foot to facilitate instant attack at any moment. The basic aim is to step forward and strike the opponent in a special way and the only method of closing this distance without loss of Shisei or balance is by the correct step. In the basic waiting position the left heel is lifted clear of the floor and the right knee slightly bent so that the body is inclined forward and some seventy per cent of the total body weight falls on to the ball of the right foot. In Kendo we are not concerned with attacks from the side or rear. There is only a single opponent who will always approach from the front. The basic posture is rather weak to the sides and backward movement is also less efficient but the whole body is poised for forward attack when required.

The right foot is advanced about the distance of its own length. There is just sufficient room for the left leg to pass in front of the right if necessary and the toes of both feet point directly forward. If the left toes are allowed to point sideways (a common fault) or if there is too much lateral distance between the feet, the thrusting action of the left foot will tend to throw the body over to the right and balance will be lost. (In my case it causes me the 'shin splint' as a side effect.) The left foot should be as close to the centre-line as possible, but not so much as to cause loss of balance or awkwardness. Balance is greatly aided by turning the toes slightly inwards, which has the effect of steadying the body inwards to the centre-line, rather similar to the result of Shibori.

SHIBORI

Shibori (wringing) is another most important action on striking. The effect of the hands being in different positions will be to drag the Shinai off centre and the Shibori action of squeezing the hands into the centre negate their effect by opposition. Shibori steadies the blade and gives definition and control to the stroke and it must be timed to co-

ordinate exactly with the moment of impact. The actual physical effect of the blow is more via kinetic energy than actual downward force [6]. What kind of tensegrous system is the left heel part of?

To answer this question I found a lead in the theory of one of the most prominent Chinese inner martial arts - T'ai Chi. And in particular in differentiating the concepts of Li and Jing.

Before we can understand Jing, we must first understand Li. Li, which is defined as muscular strength, is usually visible as big muscles. When Li is used, the muscles are tensed and stiff. So using our muscles is considered Li. However, when we use our mind and concentration to lead the muscles to do something, Ch'i (Qi, Ki) will flow to where we are concentrating and enliven the muscles. This is considered Jing. Li is said to derive from the bones and muscles. Jing comes from tendons, and is supported by Ch'i. Li has shape, while Jing has no shape or form. Li is clumsy, sluggish, stiff, stubborn and straightforward; whereas Jing is flexible, smooth, agile, alive and tricky. Li is stagnant and Jing is fluid. With Li, power is diffuse, but the power of Jing is concentrated. Li floats, but Jing is sunken.

"I use a pot of hot tea as an analogy. The heat is Qi. The pot is your body structure (Shen Ti Xing). The tea in the pot is Li (raw strength). The direction the tea goes in is Yi (intention). The tea pouring out is Jing (power)."

Robert Chu Sigung(L.Ac., QME, MSOM, Ph.D. Chinese/Ayurvedic Herbalist - Licensed Acupuncturist, and martial artist <http://www.wingchunkuen.se/robertchu.htm>)

The last has two interpretations in kendo. First, when we use muscular strength in suburi we emphasize arms and shoulders, and our movements tend to be angular and jerky. With Jing, the arms and body are relaxed, and energy is derived from waist, legs and Hara (Dan Tian). The second interpretation is that with Li the power is more from the surface, while with Jing the power is more internal. That is, the tendons, from which Jing is derived, are relatively more internal than muscles. After long training, the Ch'i (Qi, Ki) which supports Jing comes from deep within the body [7]. A good exercise for achieving Jing in our basic men swing is making 2,000 men-suburi in an uninterrupted sequence with a regular-weight shinai or at least 500 men-suburi with heavy shinai. (these practices were used by many famous kendoka in the past). I've initiated such practices and witness the elevated arrival of Ch'i and stabilization of Jing as described at the above. It seems to me that Jing is the gate toward te-no-uchi (e.g. the way of gripping the shinai, the overall use of the hands, tight

ening/loosening the grip or adjusting the balance between the two hands, when striking or responding). I also noticed that the generation of Jing alleviates and progressively diminishes 'tennis elbow' and wrist pain inflicted before.

"Power originates from the heels, travels up the ankle and knee joints, is in conjunction with the waist, issues forth from the body and rib cage, travels down the shoulders, to the elbow, to the wrist and manifests from the hands".

Robert Chu Sigung (L.Ac., QME, MSOM, Ph.D. Chinese/Ayurvedic Herbalist - Licensed Acupuncturist, and martial artist <http://www.alanorr.co.uk/htdocs/articles/wcpowerarticle.html>)

The Jing concept as I experienced brings an important angle into the etiology of the kendo heel pain and other kendo injuries. Thus, I speculate a tensegrous interaction of Ch'i and plantar fascia during effective fumi-komi. The imbalanced repetitive alternation of tense and relax of the plantar fascia, however, can produce a probable distortion of Ch'i circulation manifested as PF symptoms. The plantar fascia as many other body elements are integrated into a tensegrity system which has been identified and manipulated for thousands of years. It is the system of energy and circulation of Ch'i. It has been said that there are two ways to manipulate such tensegrity system: by generation of Ch'i (1) internally (called Wai Dan) and (2) externally (called Nei Dan).

The internal ways of Ch'i generation are possible by exercising Hara (Dan Tian) and uses the mind to guide the Ch'i. This requires many years of practice and experience. The external ways are explained by Ta Mo's classic text Yi Gin Ching (Yi Jin Jing) (Muscle/Tendon Changing Classics). In this exercising the practitioner repeatedly tense and relax some part of the body. When muscles of a part of the body are tensed, Ch'i is built up in that area. When muscles are then completely relaxed the Ch'i will naturally start to flow in other parts of the body. The external way of generation and control of Ch'i is being used by many martial art forms to different extent. Kendo and all internal Chinese martial arts undisputedly qualify as most intricate methods to control of Ch'i. It is not surprising that variety of muscle/tendon imbalances/'injuries' could be produced during the practice by inexperienced kendoka. Such imbalances/'injuries' however cannot be healed without understanding of the basic principles behind muscle/tendon usage and their dynamic interchange of Ch'i. Injuries such as the PF can never be healed by inexperienced kendoka themselves due to their insensitivity to Ch'i. It seems to me that the very nature of the heel pain, and its etiology can easily be explained by imbalance of Ch'i) during kendo fumi-komi. And as such the heel pain/PF could be a subject of treatment by

traditional methods that could circumvent the lack of experience in Ch'i control and manipulation yet implementing it rationally. Such methods of external Ch'i generation are acupressure, acupuncture and number of holistic modernizations such as energy/vibrational medicine, radionics etc.

TO DISCIPLINE THE CH'I

The same ideogram is pronounced Ch'i (Qi) in Chinese and Ki in Japanese. Even though the meaning is similar for the most part, there are certain differences. In both cultures, disciplines including martial arts intended to develop the capacity of Ch'i and Ki for long time. The difference in the modern perceptions of Ch'i (Ki) could be defined here as developmental in nature. Differences could be traced back to the pre-Buddhist times. For example, a major text Yi Gin Ching (Muscle/Tendon Changing Classics) was written in China by an Indian monk Ta Mo (Sardili, ~483AD) who is considered to be Acarya* of the Mahayana healers. Nowadays most of his concepts are propagated under name ChiGong (QiGong) which is considered without much spirituality. Even though we may find a very close Japanese counterpart of ChiGong named Kiko, the concepts of Ki there as well as in the modern Japanese collective psyche seems to have different origin and current expression. The Japanese Ki concept seems to be influenced by much newer schools of Buddhism such Mikkyo (Shingon) and Zen. As a result any attempt to understand the Japanese Ki seems to negate its own definition similarly to the Heisenberg's Uncertainty Principle on the wave/particle duality. The ultimate stage in Kiko is furen shuten, in which the body become permeable to Ki to the highest possible degree which is quite esoteric. In contrast the Chinese Ch'i (Qi) is pretty tangible and when interpreted in relation to body organs and health can be used rationally in numerous applications such as acupuncture.

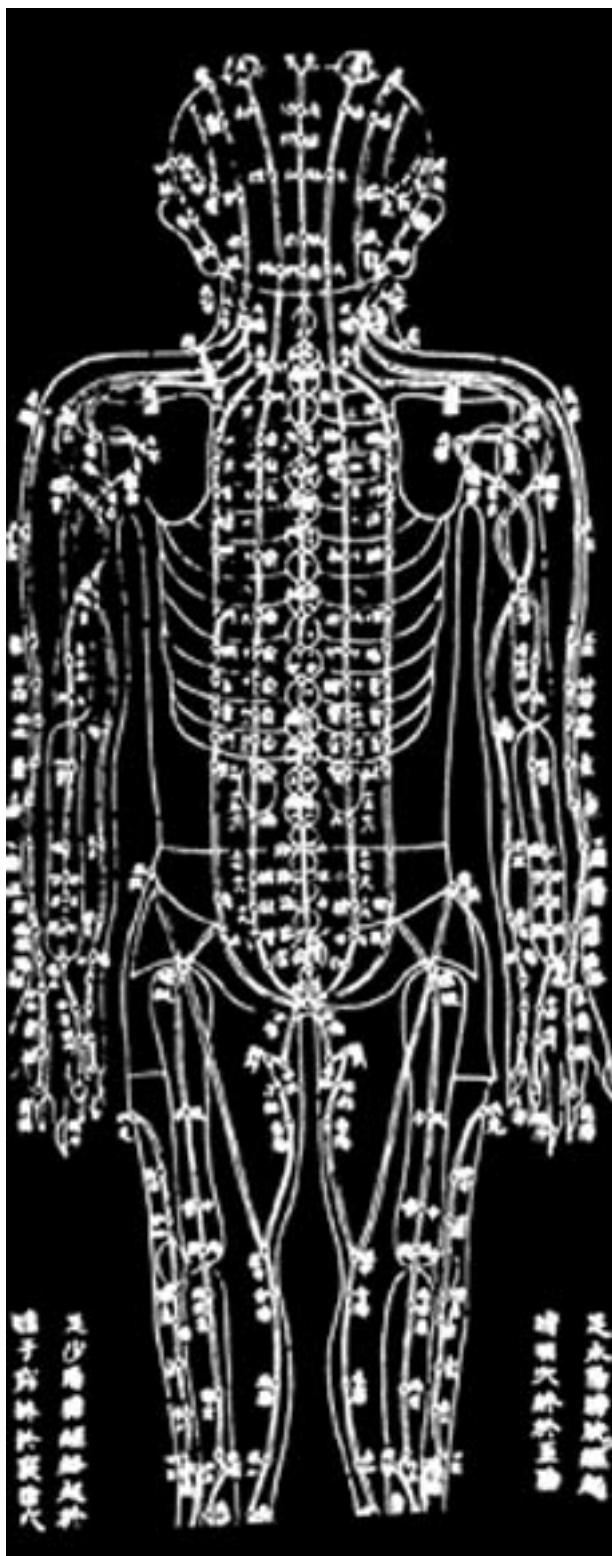
* Acarya (Sanskrit) - One who practices and teaches the esoteric teachings as a way of life.
Acupuncture

Acupuncture is one of the oldest, most commonly used medical procedures in the world. Created by warriors presumably in India and further developed in China for more than 2,000 years, acupuncture began to become better known in the United States in 1971, when New York Times reporter James Reston wrote about how doctors in China used needles to ease his pain after surgery.

FACT

The controversy concerning the origin of acupuncture is derived from a recent recovery of several prehistoric mummies with well preserved tattoos. These tattoos have numerous demarcation points on the body that do not seem to have decorative importance and seem clearly to overlap with well-

known acupuncture points [24]. This raises the possibilities that acupuncture may have originated in the so-called Euroasian continent at least two thousand years earlier than previously thought.



In the past two decades, acupuncture has grown in popularity in the United States. The report from a Consensus Development Conference on Acupuncture held at the National Institutes of Health (NIH) in 1997 stated that acupuncture is being “widely” practiced--by thousands of physicians, dentists, acupuncturists, and other practitioners--for relief

or prevention of pain and for various other health conditions. According to the 2002 National Health Interview Survey--the largest and most comprehensive survey of complementary and alternative medicine use by American adults to date--an estimated 8.2 million U.S. adults had ever used acupuncture, and an estimated 2.1 million U.S. adults had used acupuncture in the previous year [8]. Preclinical studies have documented acupuncture's effects, but they have not been able to fully explain how acupuncture works within the framework of the Western system of medicine that is commonly practiced in the United States [9-14]. It is proposed that acupuncture produces its effects through regulating the nervous system, thus aiding the activity of pain-killing biochemicals such as endorphins and immune system cells at specific sites in the body. In addition, studies have shown that acupuncture may alter brain chemistry by changing the release of neurotransmitters and neurohormones and, thus, affecting the parts of the central nervous system related to sensation and involuntary body functions, such as immune reactions and processes that regulate a person's blood pressure, blood flow, and body temperature [15-16].

FACT

In 1976 it was reported that substances that were blocked by morphine antagonists were released with acupuncture. The substances are called endorphins and were shown to be 5,000 to 10,000 times more potent than morphine.

CLINICAL TRIALS

Since early 1970s, more than 500 randomized controlled trials (RCT) have been performed on acupuncture in North America, Europe, Australia and New Zealand. While these trials cover a wide range of clinical concerns, the bulk address various pain conditions. Despite of the inconclusiveness of the bulk of the RCT evidence, at least the work on emesis and dental pain has created general consensus that “something is going on” with acupuncture therapy in a scientific sense. This has allowed acupuncture to enjoy enormous credibility within the biomedical community [17].

ACUPOINTS AND THE MERIDIAN SYSTEM

The acupuncture therapy is an outgrowth of viewpoints in our relationship to the universe around us. The principles demonstrated by the inner workings of humans are reflected in universal relationship of energy flow. One of the primary concept of the energy flow is that of ch'i (qi or ki), a unique energetic substance that flows from the environment into the body. In the model of acupuncture and variety of martial arts including kendo, Ch'i energy is adsorbed into the human body via portals of entry on the skin. These portals of entry are identified as

acupuncture points, which are inlets along a special meridian (channel) system running deep below the integument to underlying organ structures. For every organ, there is energetic flow through two sets of meridians. The acupuncture points along the meridians in the skin demonstrate unique electrical properties which distinguish them from the surrounding epidermis. The electrical resistance measured in the skin overlaying the acupoints is lower than the surrounding skin by a factor of approximately 10 to 1. The value of resistance can be measured by a special direct-current (DC) electrical amplifier/generator which helps to identify the exact location of the acupoint on the particular meridian (see section Materials & Methods for the specification of the acupuncture point locator 'Pointer Plus' used in this study).

Acupuncture is not a self-help area of medicine. The use of needles is not for everyone. Ancient Chinese medical practitioners applied magnets to relevant acupuncture points were also known to have fed a powdered magnetic substance to patient who suffered from ills such rheumatism. With the advent of the modern magnets and their miniaturization the conventional needles can be circumvented by the layman user. Application of small magnets on certain acupuncture points is a useful noninvasive solution that is believed to achieve the same healing effects as the needles [18].

FACT

Currently the earth's magnetic field is estimated to be about 0.5 gauss. Gauss (Gs) is the standard unit used to measure the strength of a magnet, a unit measure named after Karl Friedrich Gauss (1777-1855).

MAGNETIC THERAPY BACKGROUND

Applying magnets to various areas on the body to treat pain—has been used for centuries. The use of magnets can be traced to ancient Greeks, Egyptian and Chinese doctors. It was said that Cleopatra wore a magnet on her head to retain her beauty. One of the more influential figures in magnetic-healing history was the 15th century physician Paracelsus (1493-1543), who reasoned that since magnets have the power to attract iron, perhaps they can also attract diseases and leach them from the body. These insights anticipated

by nearly 500 years the underlying concepts of modern mind-body disciplines, and many holistic approaches. The development in eighteenth-century England of carbon-steel permanent magnets more powerful than lodestones brought renewed interest in the possible healing powers of magnets, and among those interested was Maximilian Hell, a professor of astronomy at the University of Vienna. Hell claimed several cures using steel magnets, but he was rapidly eclipsed by a friend who borrowed his magnets to treat a young woman suffering from a severe mental illness. The friend was Franz Anton Mesmer (1734-1815), and the success with the "magnets from Hell" never surpassed for clarity or reason, destroyed his reputation in France, and he retired to Austria. Nevertheless, magnetic therapy eventually crossed the Atlantic. Its most famous practitioner in the United States was Daniel Palmer, who in 1890 opened Palmer's School of Magnetic Cure in Davenport, Iowa. Today Americans spend an estimated \$500 million per year on magnets to treat pain. Most magnets sold to consumers are "static" magnets, meaning they have an unchanged magnetic field. Some researchers theorize that magnets may change how cells function; others suggest that magnets may change the brain's perception of pain or may affect how cells respond to pain. Another theory is that because blood contains iron, it may act as a conductor when magnets are applied. According to this theory, increased blood flow results in increased flow of oxygen and nutrients to tissues.

MATERIALS & METHODS

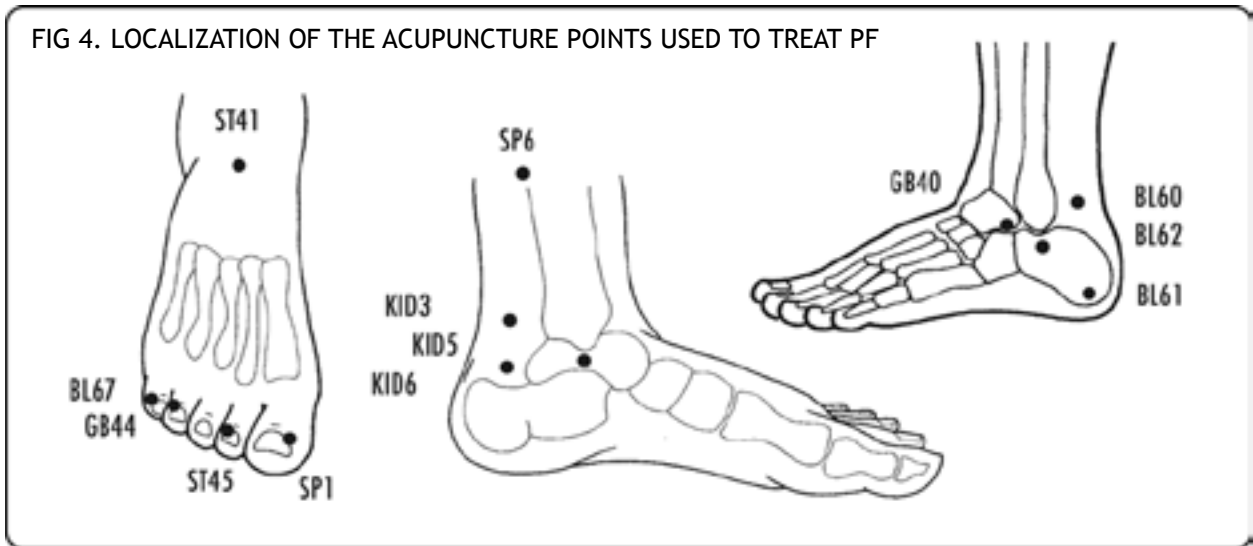
1. ACUPUNCTURE POINTS

Referring to variety of sources I identified the names of a set of acupuncture points frequently recommended and used for the treatment of PF (see the table below). A selected set of ten acupoints were engaged with TheraP Magna-Dots (1000 Gs, see following section) to treat PF pain and 'inflammation'. Changes of the pain in the area of medial tubercle and the mechanical function general when toes of the left foot are dorsiflexed (see Fig.3) were monitored in mornings, before and af-

NO#	ACU-POINT ABBREVIATION	ACU-POINT NAME	REFERENCES
1	ST41	Jiexi	19(p.320),23(p.139)
2	SP6	Sanyinjiao	19(p.192),20, 23(p.146)
3	BL60	Kunlun	19(pp.314,319,322,459),20,21,22(p.688)
4	BL61	Pucan/Pushen	19(p.320),23(p.194)
5	BL62	Shenmai	19(pp.319,322),22(p.688)
6	BL67	Zhiyin	19(pp.320,326),21,22(p.688)
7	KID3	Taixi	19(pp.319,326),20,21,22(p.688)
8	KID6	Zhaohai	21, 22(p.688)
9	GB40	Qiuxu	19(p.320,459),23(p.245)
10	GB44	Zuqiaoyin	19(p.320),21,22(p.688)

ter kendo practice.

FIG 4. LOCALIZATION OF THE ACUPUNCTURE POINTS USED TO TREAT PF



Original acupuncture points and combinations listed by reference source/page:

- (Ref. 20): KID3, BL60, SP6
- (Ref. 21): KID1, KID3, KID6, BL60, BL67, GB44
- (Ref. 22-p688): KID3, KID5, KID6, BL60, BL62, BL67, GB44, ST45, SP1
- (Ref. 19-p192): SP6, ST36, GB39
- (Ref. 19-p314): BL56, BL57, BL60
- (Ref. 19-p319): BL60, BL62, KID3
- (Ref. 19-p320): BL61, BL67, ST41, GB40, GB44
- (Ref. 19-p322): BL62, GB31, GB30, BL40, BL60, ST33, BL57
- (Ref. 19-p326): BL67, SP9, GB30, GB38, KID3
- (Ref. 19-p459): GB40, GB39, BL60
- (Ref. 23)p.139:ST41; p.146:SP6; p.194:BL61; p.201:KID4; p.245:GB40

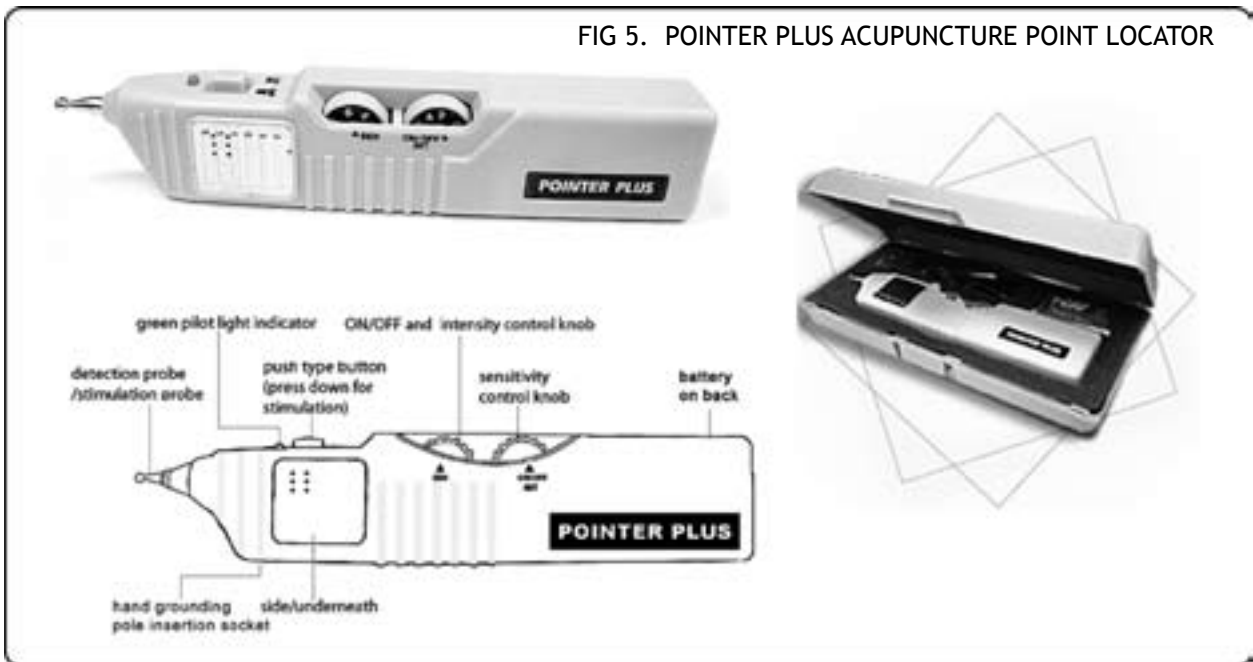
tures and instruction below).

2. ACUPUNCTURE POINT LOCATION

Pointer Plus is a hand-held (6.5” long, 60 grams), battery operated acupuncture point locator and stimulator. Pointer can accurately identify meridian’s low resistance points which are located near the skin’s surface. Pointer Plus’ sensor/electrode measures the difference in electrical resistance between a low resistance point and the surrounding skin. Precise location of the point is indicated by a buzzer and a flashing green light. At a push of the applicator button and a mild electrical pulse is applied through the same sensor / electrode for 15 - 20 seconds. This procedure should be repeated for each of the points in search. Pointer Plus is adjustable for voltage and point locator sensitivity. Pointer Plus uses a single 9 volt battery and comes with a sturdy plastic case.

To identify the acupoints listed in the above I used an electric locator “Pointer Plus” (Figure 5, fea-

Pointer Plus Features: Two interchangeable probes - larger probe tip for body points and a small tip



INSTRUCTIONS TO USE THE POINTER PLUS STIMULATOR/LOCATOR

NO OF STEPS	DESCRIPTION
1	Insert the 9 volt battery onto the battery clips, the positive and negative poles of the battery should always be matched correctly with the respective battery clips.
2	Select the correct probe (tip) for use with body points.
3	Touch the grounding metal plate on the front side of the unit and then search for the point or use the ground wire to close the electrical circuit.
4	Press each point slightly, the probe uses a spring mechanism so that a constant pressure may be maintained during location. The respective trigger or acupuncture point is located when a continuous sound is heard from the buzzer and at the same time the LED light located in front of the APD / STI button is flashing continuously.
5	The sound emitted from the buzzer may be muffled or reduced by covering the holes of the metal grounding plate with your thumb.
6	If stimulation is required on this point, simply adjust the intensity knob "INT" to an acceptable level and press the APD /STI button. When this button is released, the unit is immediately returned to the point detection mode. Pressing the APD / STI button again will produce output stimulation.
7	It is recommended to begin treatment with a low intensity setting, thereafter turning the "INT" control until a comfortable intensity is reached
8	In order to treat your friends, the grounding pole must be attached with the plug jack to the bottom of the unit. The patient must hold the grounding pole to complete the electrical circuit which then activates both the detection and stimulation functions. The above procedures 6 to 13 are then followed
9	Turn off the unit after use. Remove the battery from the unit when the device will not be used for a long period

for ear points (ear 2 mm 0.08" and body 4 mm 0.16"); Acupoint locator and Sensitivity Adjustment; Intensity adjustment - 0 - 22 milliamps; Frequency Output - 10 Hz.; Pulse Width - 240 microseconds; Waveform - continuous; Waveshape - biphasic square pulse with negative spike; Power Supply - nine (9V) volt alkaline battery; Storage Case, Grounding Pole and Instruction Booklet.

3. ACUPUNCTURE POINT MAGNETIC TREATMENT

After location and marking of the ten acupoints listed at the above, ten magnets (Magna-Dots, manufactured by TheraP, 20 x 1000 Gs magnets with 50 self-adhesive patches) were affixed on the skin and maintained till the symptom of the PF disappeared. The adhesive properties of the original patch were not stable especially during friction of textile fabrics around the ankle and bathing procedures. They were frequently replaced with conventional Band-Aid (Johnson & Johnson) adhesive sections at every occasion of detachment while the position of the Magna Dot was maintained at the same acupoint. TheraP Magna-Dots are distributed by Homedics, Inc., 2240 Greer Blvd., Keego Harbor, MI 48320-1469 (<http://www.homedics.com/prod/detail.aspx?ID=221>)

In addition to acupoints located Magna-Dots I used and still use specifically during practice an Ankle Wrap (TheraP, Model MW-A) which holds a dozen

flat circular embedded magnets and thus located around the foot arch (<http://www.homedics.com/prod/detail.aspx?ID=224#>).

Results

To treat plantar fasciitis syndrome caused by improper use of my left foot during kendo I used 10 traditional acupuncture points and 10 x 1,000 Gs

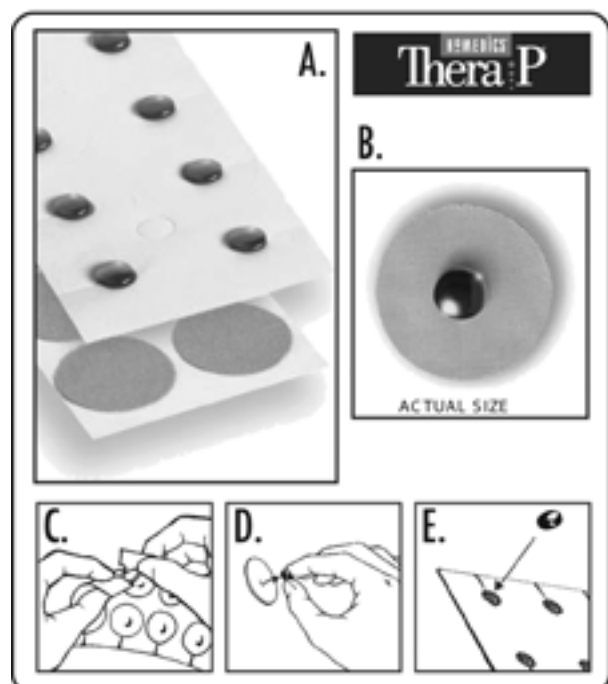


FIG 6. MAGNA-DOTS PACKAGE AND MANIPULATION

INSTRUCTIONS FOR USE OF THERAP MAGNA-DOTS (FIGURE 6)

NO OF STEPS	DESCRIPTION
1	Clean and dry the application area(s) free of dirt and oil.
2	Remove Magna-Dot from wax backing as shown in figure 6C.
3	Apply to affected area. Depending on size of the treatment area, two or more Magna-Dots may be applied.
4	Magna-Dots may be left on for several days
5	Magna-Dots are reusable - simply peel the magnet off the used adhesive patch and apply to a new adhesive still on the strip. See figures 6D & 6E. Then begin again with Step #2, above.

magnets attached on the skin over each acupoint. The magnets were maintained over the designated acupoints for approximately 30 days. A total recovery of the plantar fascia was achieved judging by the disappearance of the typical symptoms of morning stiffness and acute pain after practice. The pain was mostly localized in the area of calcaneal tubercle and clearly detected by palpation. Traditional foot massages in the area as well as spa treatments brought temporal relieve. Decrease of intensity of kendo practice was not effective either. Usage of variety of arc supports available on the market showed no influence on the healing process.

Summary and Discussion

Biomechanical over-pronation of the plantar fascia does not provide a functional model for treatment of syndrome of plantar fasciitis (PF). The results presented in this article support a tensegrity model using the acupuncture meridian system where the plantar fascia is uniquely positioned. I hypothesize that the improper use of the left heel during kendo footwork manifested as PF, associates with distorted rhythms of muscle/tendon relax/tense states. Such arrhythmic pattern may have resulted into imbalanced/distorted Ch'i exchange/flow between different meridians and governed systems.

PF is known to be an outstanding injury among runners after their 40s. The runner's PF has similar symptomatic to the kendoka's PF, however, the two PFs are only superficially identical. The heel pain in kendo may have different etiology from the popular PF form. The heel anatomical and energetic structure (in terms of meridian association) presents characteristics of a tensegrity system which involves a continuous network from the area of the plantar fascia to other anatomical systems via acupuncture meridians. Evidence for that is the accumulation of acupoints points from multiple meridians at the heel. It takes many years of kendo practice under qualified guidance to bring such tensegrity system into accurate control. In contrast, relatively short usage of improper fumi-komi (few months) with improper use of the heel can bring symptoms characteristic of a kendo-type-PF

to those over 40 and sometime younger kendoka. To be treated successfully the kendo-type-PF should be understood in the framework of the meridian theory. As such should be treated from energetic (Ch'i) point of view. Treatment of the heel to restore the normal Ch'i flow in few major meridians culminating at the heel (as listed in Material & Methods) as well as correcting the heel's biomechanical routine has been shown to bring significant effect in my case.

In conclusion, we should build sensitivity to our own fumi-komi execution especially to the dynamics of the muscle/tendon use and their rhythmic performance. The hazard to develop Ch'i anomalies exists not only for the left heel, but for other joints such as wrists, shoulders and elbows. The heel however has an exclusive position since it is position at the end/beginning of key acupuncture meridians. According to some traditional perspectives (Ch'iGong) such end/beginning points in the heel are major portals for Ch'i influx. As such the motion and behavior of the heel has strong tensegrity effect.

"Swordsmanship is basically the exercising of the Life Force and, therefore, at the beginning of the study the Life Force is exercised by means of technique."

Issai Choizan, Tengu-geijutsu-ron (Discourse on the Art of the Mountain Demons, 1729)

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DISCLAIMER

Magnet therapy can be a useful self-help strategy for variety of conditions. For severe symptoms or discomfort, or the appearance of new symptoms, always seek the help of your general practitioner or an experienced alternative health practitioner. The use of powerful magnets should not be attempted without the presence of an experienced magnet therapist.

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