LASER VERSUS DICLOFENAC PHONOPHORESIS IN TREAMENT OF PLANTAR FASCIITIS PAIN

A Thesis

Submitted for Basic science Department In Partial Fulfillment of Master Degree In Physical Therapy

By

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Laser versus diclofenac phonophoresis in treatment of plantar fasciitis pain: Amaly Refat El-Mahdy Herz, Supervisors: Prof. Dr. **Samy Abd El-Samad,** Prof. Dr. **Maher El-Keblawy,** Basic Science Department, Faculty of Physical Therapy, Cairo University and Prof. Dr. **Yasser El-Meligy,** Orthopedic Surgery Department, Faculty of Medicine, Cairo University (Egypt):Fac.of phys.ther Thesis;M.Sc., Basic Science Department;2009.(P 85).

ABSTRACT

Thirty patients with chronic plantar fasciitis from both sexes were involved, aged between 30-50 years. They were divided into two equal groups, 15 patients each, patients in the first group received laser therapy in addition to stretching exercises, patients in the second group received diclofenac phonophoresis in addition to stretching exercise, training was done three times a week for 4 weeks, pain level and foot function were measured before and after treatment. There was significant difference within both group in decreasing pain and improve function of the foot pre and post treatment and there were no significant difference between treatment groups in decreasing pain and improve function of the foot Laser and diclofenac phonophoresis proved to be beneficial in improving pain and the function of the foot.

Keywords: Laser – Diclofenac Phonophoresis – Plantar Fascitis.

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List of Abbreviations

Abbreviation	Name
ADM	Abductor digiti minimi.
AH	Adductor hallucis.
B.M.I	Body mass index.
DIP	Distal interphalangeal.
EDL	Extensor digitorum longs.
EHB	Extensor hallucis brevis.
F.F.I	Foot function Index.
FDB	Flexor digitourm brevis.
FDL	Flexor digitourm longs.
FHL	Flexor hallucis longs.
Ga Al As	Gallium aluminum arsenide.
J/point	Joule/point.
LASER	Light amplification by stimulated emission of radiation.
LILT	Low intensity laser therapy.
MHz	Mega hertez.
Microg/ml	Microgram per mille.
MTP	Metatarsal phalangeal joint.
Mw	Mega watt.
Nm	Nanometer.
NSAIDs	Non steroidal anti inflammatory drugs.
O.A	Osteoarthritis.
PB	Pronus brevis.
PF	Plantar fascitiis.
PH	Phonophoresis.
PIP	Proximal interphalangeal.

QP	Quadratus plantae.
TA	Tibialis anterior.
TP	Tibialis posterior.
US	Ultrasound.
V.A.S	Visual analogue scale.
V.R.S	Verbal rating Scale.
W/cm	Watt per centimeter.

Chapter I
Introduction

Plantar fasciitis (PF) is the most common cause of plantar heel pain resulting from repeated trauma at its origin on the calcaneus (**Cornwall and McPoil, 1999**). Other names for PF include runner's heel, subcalcaneal pain, and calcaneal periostitis (**Davies et al., 1999**). Several causes have been hypothesized, with the most common being overuse due to prolonged weight-bearing, obesity, unaccustomed walking or running, and limited dorsiflexion of the ankle joint. PF affects individuals regardless of sex, age, or activity level. It is seen in physically active individuals such as runners and military personnel, but is also prevalent in the general population, particularly in women ages 40-60 (**Singh et al., 1997**).

Nonoperative treatments for plantar fasciitis vary widely although the majority of patients with plantar fasciitis have resolution of the symptoms within ten months; approximately 10% have development of persistent and often disabling symptoms (**Davies et al., 1999**).

When nonoperative treatment options are unsuccessful, physicians often resort to open or endoscopic release of a portion of the plantar fascial insertion onto the calcaneus. As with any surgery, fascial release is not without substantial risk and may be associated with prolonged healing time and postoperative rehabilitation; and alteration of foot biomechanical integrity may also occur (**Wang et al., 2000**).

Because of the recognized risks and delayed healing associated with surgery, alternative non-operative therapeutic modalities have been assessed, as more recently low energy shock wave therapy ,ultrasound, iontophoresis, laser and acupuncture (**O'Malley et al., 2000**).

(1) the introduction of medication to a local area without invasion of the skin and (2) the synergistic interaction of US and drugs (**Wells, 1977**). In physical therapy, phonophoresis with nonsteroidal anti-inflammatory drugs (NSAIDs) is commonly used to treat inflamed tissues (**Byle, 1995**). Physiologic and pharmacologic studies have shown that hyperalgesia can be eliminated by treating an animal with a variety of drugs, including opioids and NSAIDs (**Gelgor et al., 1986**).

Although NSAIDs are used principally for symptomatic relieve of pain and inflammation. These drugs usually provides temporary relieve of the mild to moderate pain especially those associated by inflammation. There is an adverse reaction usually to oral NSAIDs which involve GIT particularly erosion of gastric mucosa, dyspepsia, heart burn, epigastric distress, nausa and abdominal pain (**Carpenter, 2001**).

Thus, U.S and a topical NSAIDs product could be combined not only to provide an additive or synergistic effect, but also to enhance skin penetration of NSAIDs, thereby optimizing treatment of the condition and give minimal risk of hepatic and renal injury (**Benson et al., 1989**). Diclofenac, is a NSAIDs with both anti-inflammatory and antinociceptive actions, is widely used in clinical practice, especially for painful and inflammatory rheumatic conditions and certain nonrheumatic conditions (**Todd and Sorkin, 1988**).

Statement of the Problem

Although LILT was proved to be helpful in painful condition, there are controversial results of LILT treatment for planter fasciitis patients . On the other hand phonophoresis have been used in management of pain and inflammation in muscloskeletal condition such as epicondylites, tendonitis, bursitis and O.A.but unfortunately there is no study investigating the effect of it

reducing treatment cost, avoiding surgical interference and improve life style of these patients

Delimitation

This study was delimited by the following:

- Thirty patients with inferior medial heel pain were diagnosed by the same orthopedist as a chronic plantar fasciitis.
- Their ages ranged from 30 to 50 years old.
- Pain level was assessed by visual analogue scale (VAS).
- Foot Function index (FFI) was used to measure pain and disability of the foot.
- Patients received twelve session, three times per week.
- Ga- As- Al infrared LASER.
- Sonoplus 417 ultrasound apparatus.

Limitation

This study was limited by the following.

- Psychological condition of subject during treatment.
- Individual difference in perceiving and expressing pain.

Basic assumption

It was assumed that

- All patients followed the instructions and advices during treatment.
- All patients shouldn't take any medication which might affect the results of this study.

Chapter II

Literature review

The literature presented in this chapter is aiming to provide background information related to the stated purposes. The review of literature was organized under the following topical area

I)Anatomy of the foot.

II)Plantar fasciitis.

III)Laser therapy.

IV) Phonophoresis therapy.

I)Anatomy of the Foot

The important structures of the foot can be divided into several categories. These include anatomy of:

1. The muscles.
2. The blood vessels.
3. The plantar fascia.

1-Muscles of the foot

The muscles of the foot are those of the big and little toes, the quadratus planatae, the extensor digitourm brevis, the flexor digitourm brevis, the lumbricales, and the interossei.

1-Muscles of dorsum of foot

The only intrinsic muscle that is clearly on the dorsum of the foot is the extensor digitorum brevis. It arises laterally on the dorsal foot, from the distal aspect of the calcaneus, the lateral talocalcaneal ligament, and the cruciate crural ligament. The tendons of insertion attach similarly in toes 2, 3, and 4 onto the

A-First layer

It includes from medial to lateral ,the abductor hallucis, the flexor digitourm brevis (FDB)and abductor digiti minimi (ADM) as well as plantar aponerosis to which the first layer muscle are deep, all structures arises from calcenous and inserts in to proximal phalanges .the abductor hallious tendon attach to the medial base of hallious where it blend with the medial capsule of the first (MTP) joint.the (FDB) gives off from tendon , one to each to the lesser toes. contraction of (FDB) cause flexion of the proximal interphalangeal (PIP)joint the (ADM) inserts on to the lateral aspects of the plantar plate of the fifth toes (**Thordarson, 2004**).

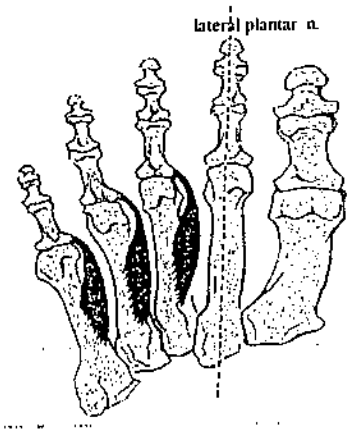
B-Second layer

It contains the tendon of flexor hallucis longs (FHL) and the flexor digitourm longs (FDL),the quadratus plantae muscle and the four lumbricales. The quadratus plantae (QP) orginates as two muscle bellies on the medial and lateral inferior surface of the calcenus and attach to the lateral border of the(FDL) tendon(QP) acts as helper in flexing the little toes the(FHL) and (FDL) tendons attach to the base of of the distal phalanges and flex the toes at the distal interphalangeal (DIP) joint.the lumbricales arise from the medial border of each of four separate (FDL) tendons. they insert on to the medial aspect of the extensor head after having passed under the transverse metatarsal ligaments.the action of the lumbricales is to flex the(MTP) joint while extending the (PIP)and (DIP) (**Thordarson, 2004**).

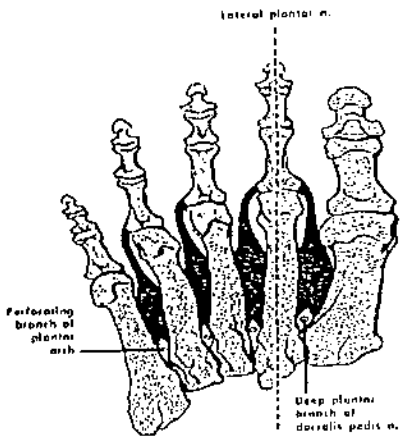
C-Third layer

The **flexor hallucis brevis**: Is a short muscle situated deep in the sole of the foot appearing between abductor hallucis medially and flexor digitourm brevis laterally. It arises from the medial side of the planter surface of the cuboid behind the groove for peroneus longus and the adjacent surface of the lateral cuneiform and from the tendon of tibialis posterior. the muscle divides into two

because the hallux and minimus both have their own abductors. The three plantar interosseus muscles originate from one metatarsal and insert onto the base of the distal phalanges of the same toes. The four dorsal interosseus muscles arise from two adjacent metatarsals and insert onto toes 2, 3, and 4 . **(Riegger, 1988).**



(Fig. 2) The arrangement of the plantar inter-ossei of the right foot, plantar aspect. They are supplied by the lateral plantar nerve.**(adopted from Gardener et al., 1969)**



(Fig.3) The arrangement of the dorsal interossei of the right foot, plantar aspect. they are supplied by the lateral plantar nerve.**(adopted from Gardener et al., 1969)**