

Using of Laser Therapy in the Treatment of Patients With Plantar Fasciitis

* *Dhia AK Jaddue M.B.Ch.B F.R.C.S (ED) Consultant Orthopedics Surgeon*

** *Ali. Sulaiman. M. Said Al-dulaimi M.B.Ch.B FICMS (ORTHO) Orthopedics Surgeon*

Abstract

Background: planter fasciitis is a common condition seen in adults and sport men, it is characterized by dull pain in the heel, especially when getting up and standing on the foot in the morning or after sitting for a long time.

Recently low level laser therapy is used as a method of treatment.

Objective: to evaluate the benefit of laser therapy in treatment of planter fasciitis.

Methods: Out of twenty five patients with planter fasciitis exposed to laser therapy. Laser used is (diode

type) given in two sessions per week for four weeks, time for each session is about (12 minutes).

Results: complete recovery seen in (32%) of patients, moderate improvement in (16%), mild improvement in (24%), no response in (28%), deterioration (0%).

Conclusion: laser therapy is safe for treatment of planter fasciitis, free of side effects, very effective as an alternative to surgery and local steroid injection, with no deterioration in the condition during or after laser therapy.

Key word: planter fasciitis, laser therapy, calcaneal spur.

Introduction

Plantar fascia is thick, inelastic band of fibrous tissue that course along plantar surface of the foot⁽¹⁾.

Plantar fasciitis refers to an inflammation of plantar fascia. Typically, plantar fasciitis result from repeated trauma to the tissue where it attaches to the calcaneus, this repeated trauma often results, in microscopic tearing of plantar fascia at or near the point of attachment of the calcaneus. The result of the damage and inflammation is pain^(1,2).

If there is significant injury to the plantar fascia, the inflammatory reaction of the heel bone may produce spike-like projection of new bone called heel spur. The spurs are not the cause of the initial pain of plantar fasciitis, most heel spurs are painless^(1,2).

Plantar fasciitis is typically starts as a dull, intermittent pain in the heel, may progress to sharp, constant pain .often it is usually worse in the morning or after sitting and then decrease after standing or walking^(1,2).

Often people who develop plantar fasciitis have several risk factors they include treatment, the methods of treatment are, anti-inflammatory medication, acupuncture, icing, stretching of calf muscles, activity modifications, arch support, corticosteroid injection^(2,3,4). Rarely surgical treatment is necessary, however it may be indicated when the non surgical treatments have been tried and failed. Surgical options include

Al- Kindy Col Med J 2008; Vol .4 (1): p72-76

open surgery; (surgical removal or release of the fascia, removal of bone spurs) or endoscopic plantar fasciotomy (EPF)⁽⁵⁾.

Laser therapy (low level laser therapy L.L.L.T) is the application of red or near infra- red light⁽⁶⁾ over injuries or lesions to improve soft tissue healing and to give relief for both acute and chronic pain^(7, 8, 9). The effect is photochemical (like photosynthesis in plants), red light aids the production of ATP, providing the cell with more energy which in turn means the cell is in optimum condition to play its part in a natural healing process^(8,10,11). L.L.L.T aims to biostimulate the tissue, and the effects are biochemical, not thermal, cannot cause damage to living tissues^(8, 10, 11).

Laser light does not disperse as an ordinary light does and the energy concentration of the laser light is much higher than that of other light forms^(6,11).it is this concentration that enables laser light to penetrate deep into injured tissue where it is absorbed by cytochromes, porphyrins within the mitochondria and cell membranes^(12,13).

On the cellular level the resulting photochemical reaction cause formation of photon gradient across the mitochondria and cell membrane changing

their permeability to various ions, leading to increase cellular ATP and DNA production, this produce increase oxygen consumption, activation of tissue respiration and suppression of anaerobic processes as well as increased cellular metabolism

that expedites cell repair, regeneration of damaged tissue and the stimulation of the immune , lymphatic and vascular system^(13,14,15).

Methods

During the period from September 2002 - December 2003, out of twenty five patients with plantar fasciitis examined, they agreed to be treated with laser, and they complain of dull Intermittent pain in the heel which may progress to sharp, constant pain.

15 patients were treated with laser in Al-wasseti hospital, while the other was treated in the Al-Qanat physiotherapy center.

The average period for follow up was six months; the patients were seen once every month to evaluate the pain and tenderness.

The laser used is semiconductor diode laser, with wave length (820nm) which allows deep penetration. It is applied (twice/week for four weeks).

Laser probe is directed into three areas: area one (plantar side of calcaneum), area two (lateral surface of Achilles), area three (back surface of Achilles).**(Table-1)**

(Table- 1)

The dosage of the laser therapy according to the area mentioned

No.	The area of application	Frequency	Exposure
1	Plantar side of calcaneum	1000Hz	4min
		50Hz	2min
2	Lateral surface of Achilles tendon	1000Hz	2min
		50Hz	1min
3	back surface of Achilles tendon	1000Hz	2min
		50Hz	1min

Results

The patient's age is between (31-70) years, the commonest age is (31-50). 14 of them were male and the rest were females, the female to male ratio was (1:1.3).

Regarding occupation 13/25 were involved in heavy duty job, while 12/25 with light jobs.

Most of the patients show no associated diseases, while six patients have high arch foot, flat foot and diabetes mellitus as shown in **(Table- 2)**

(Table-2)

Diseases associated with planter fasciitis

Disease	Number	%
High arch foot	3	12%
Flat foot	2	8%
Diabetes mellitus	1	4%
Rheumatoid	0	0%
Not associated	19	76%
Total	25	100%

Calcaneal spurs were seen in 7 of 25 patients, while the rest showed no spurs.

Previous history of local steroid injection was found in 8/25 patients, the other patients received no steroid injection.

8 of the patients showed complete, moderate, or mild response, the rest of patients showed no responses. No patient showed any deterioration in their symptoms; **(Table- 3):**

(Table-3)
Types of general response

Type of response	Number	%
Complete recovery	8	32%
Moderate improvement	4	16%
Mild improvement	6	24%
No response	7	28%
Deterioration	0	0%
Total	25	100%

Patients of 30-40 years show better response, and patients between 41-60 years showed some response, (Table- 4)

(Table-4)
Responses related to age

Age	31-40	41-50	51-60	61-70	Total
Complete recovery	4	2	2	0	8
Moderate improvement	1	1	1	1	4
Mild improvement	1	3	2	0	6
No improvement	1	4	1	1	7
Deterioration	0	0	0	0	0

Male has slightly better response than female as shown in (Table-5):

(Table-5)
Response related to sex

Sex	Female	Male	Total
Complete response	4	4	8
Moderate Improvement	1	3	4
Mild improvement	3	3	6
No improvement	3	4	7
Deterioration	0	0	0

Response related to occupation is better with light duty as in (Table- 6):

(Table-6)
Response related to occupation

Occupation	Heavy duty	Light duty	Total
Complete response	3	5	8
Moderate Improvement	2	2	4
Mild improvement	4	2	6
No improvement	4	3	7
Deterioration	0	0	0

Patients with no calcaneal spur show better response (Table-7)

(Table-7)
Response related to Calcaneal spur

Spur	Present	Not present	Total
Complete response	0	8	8
Moderate Improvement	1	3	4
Mild improvement	2	4	6
No improvement	4	3	7
Deterioration	0	0	0

Patients with no previous local steroid injection have better response than those who received previous injection (**Table- 8**):

(Table-8)
Response related to local steroid injection

Steroid injection	Received	Not received	Total
Complete Response	2	6	8
Moderate Improvement	1	3	4
Mild improvement	3	3	6
No improvement	2	5	7
Deterioration	0	0	0

Discussion

Plantar fasciitis is a common problem characterized by deep pain in the plantar aspect of the heel, particularly on arising from bed, although the pain often subside after a few steps, in some patients the pain may persist for longer period^(1,7).

L.L.L. effects are photochemical, not thermal and are causing no damage to the cells; the light is used to stimulate the body's own processes in healing tissue^(2, 3, 5).

Three parameters are important for clinicians to achieve the best possible therapeutics effects when using L.L.L, selection of the correct beneficial wave length, the use of the correct power level, the consist application of the necessary amount of energy^(14,16,17).

The Commonest age of presentation of the disease was between 31-50 years seen in 17 patients (68%) probably because they are the more active people.

There was no significant difference between male and female regarding the response to the treatment although the condition was seen more in male because they are more active and this coincide with the study of Navratil *et.al*⁽¹⁸⁾ who found in 50 patients, the ratio was 3/2.

Regarding Occupation, planter fasciitis seemed to be slightly more common in those with heavy duty than those of light duty and this is due to increase tension on planter fascia⁽³⁾.

Nineteen patients (76%) showed no associated diseases, 12% had high arch, 8% had flat foot and 4% had diabetes mellitus. the results of this study were slightly similar to those gained by Ossatro *et.al*⁽¹⁹⁾ On 40 patients with planter fasciitis, 15% of them had high arch, 10% with flat foot, 1% rheumatoid arthritis, 1% gout, 2% diabetes mellitus.

Calcaneal spur was seen in 28% of patients and the rest showed no spur, it seemed that spur is not the initial cause of pain.

In assessment of the response to laser therapy in our 25 patients after eight sessions of laser therapy, complete recovery was seen in 8 patients 32% (No pain), moderate improvement seen in 4 patients 16% (Very mild pain on getting up from sitting position), mild improvement was found in 6 patients 24% (Pain under the heel after getting up from sitting position but less than before), so good results were seen in 48% of all cases (include complete & moderate recovery). Over all response are seen in 18 patients 72% i.e. patients with mild, moderate and complete improvement. In 7 patients 28% no response was seen. Treatment with laser therapy showed no deterioration in their condition. This finding goes with the finding of Gill IH Kiebzak, gm⁽¹⁶⁾.

The effect and response of laser therapy showed no differences whether the occupation is light or heavy, this goes with a study of Basford, RJ, Malage⁽²⁰⁾.

Response to the laser therapy didn't show high variation, whether the patient had calcaneal spur on X-ray or not and L.L.L.T. hadn't any effect on the spur itself. 15 patients (60%) out of 18 patients with no calcaneal spur showed improvement, while 3 cases (12%) out of 7 patients with calcaneal spur showed moderate to mild responses.

Previous local injection seemed to have no effect on laser therapy, 12 out of 17 patients i.e. (70.5%) with no local injection showed improvement. 6 out of 8 patients i.e. (75%) with local injection showed improvement, this goes with a study of Basford, RJ, Malage⁽²⁰⁾ who examined 30 patients and found no difference regarding the response to laser therapy, whether the patient had received local steroid injection or not.

Conclusions

L.L.L.T. is safe, free of side effects. Now it is available and cost effective. Laser therapy proved to be very effective as alternative to surgery. There is no feeling of discomfort during and after the treatment sessions. There was no deterioration in symptoms.

Recommendations: Laser therapy is a good method as primary treatment of planter fasciitis. It is a therapy for patients who received local steroid injection and did not get benefit, for patients who afraid from local steroid injection and the patients with diabetes mellitus, because of the risk of infection with local injection.

References:

1. Singh D, Angel J, Bentley G, Trevino SG. Plantar fasciitis. *BMJ* 1997; 315:172-5.
2. Wolgin M, Cook C, Graham C, Mauldin D. Conservative treatment of plantar heel pain: long-term follow-up. *Foot Ankle Int* 1994; 15:97-102.
3. Lynch DM, Goforth WP, Martin JE, Odom RD, Preece CK, Kotter MW. Conservative treatment of plantar fasciitis. A prospective study. *J Am Podiatr Med Assoc* 1998; 88:375-80.
4. Acevedo JI, Beskin JL. Complications of plantar fascia rupture associated with corticosteroid injection. *Foot Ankle Int* 1998; 19:91-7.
5. Www laser equipment.com, laser therapy, 2000
6. Easy laser physics
www.physics.ox.ac.uk/AL/research/groups/laser/lasers.html
7. Available: Www heelspur.com 2003.
8. Available: <http://www.arthroscopy.com>
9. Bjordal JM, Couppe C, Chow RT, Tuner J, Ljunggren EA. A systematic review of low level laser therapy with location-specific doses for pain from chronic joint disorders. *Aust J Physiother.* 2003; 49(2):107-16.
10. Chandler,t,j.kibler.w.b. A biomechanical approach to the Prevention, treatment and rehabilitation of plantar fasciitis. *Sports med.* 1997; 15 (5):344-52.
11. Microlight corporation of America 501(k) summary www.fda.gov/cdrh/k10
12. Weintraub mi, non- invasive laser neutralism in plantar fasciitis 1997,20;1029-31
13. Paudua, paudua R, april, tonail P non-invasive laser therapy in plantar fasciitis muscle nerve 1998,21 1232-3
14. Simunovic Z. lowlevel laser therapy with trigger points technique; a clinical study on 243 patients. *J clin laser med surg* 1996; 14: 164-7.
15. Bendnarnaska,K, Rozga,B, Kolodzieczk,D, Leyko,W and bryszewska,m Effect of laser therapy on the viability of human skin fibroblast. *radiat environ.biophys*(1998);37(3):215-7.
16. Gill,lh, kiebzak,gm. Outcome of nonsurgical treatment for plantar fasciitis. *Foot ankle int*, (1996); 17(9): 527-32.
17. Gill,lh .Plantar fasciitis; diagnosis and conservative management.*jam acad orthop surg*,1997;5(2) 109-17.
18. Navratil,l ,*et al.* Recent photography a laser therapy (in czech).isbn 80-902318-3-7, manus paraha, 2000. 277pp
19. Ossatro.fda summary of safety & effectiveness <http://www.fda.gov/p990086b.pdf>
20. Basford.RJ, Malaga,GA, Krause,DA, Harmsen,WSa randomized control evaluation of low level laser therapy; plantarfasciitis`.arch.phys.med.rehabil. .1998 ;79 (3):249-54

Al-Kindy Col Med J 2008 Vol.4 (2) P 76

**From the department of surgery Al- kindy College of Medicine .Consultant orthopedics surgeon.*

*** Orthopedics surgeon*

Correspondence Address to:

Received at 2nd Sept. 2007 Accepted at 25th Feb 2008