

Case Report

Treatment of Lymphedema Praecox through Low Level Laser Therapy (LLLT)

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Abstract

A 15-year-old girl with right lower extremity lymphedema praecox was treated through Low Level Laser Therapy (LLLT), by means of a GaAs and GaAlAs diodes laser-therapy device. Treatment sessions were totally 24, each cycle containing 12 every other day 15-minute sessions, and one month free between the cycles. The treatment was achieved to decrease the edema and no significant increase in circumference of involved leg was found following three months after the course of treatment. Although LLLT can be considered a beneficial treatment for Lymphedema Praecox, any definite statement around its effectiveness needs more studies on more cases.

KEYWORDS: Lymphedema Praecox, Laser, Treatment, Low Level Laser Therapy, LLLT.

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Lymphedema is a disorder caused by obstruction of lymph flow.¹ Primary lymphedema results from improper lymphatic development that is not attributed to injury, trauma, illness, or disease. The damaged lymphatics cannot propel lymph in adequate quantities and fluid accumulates in the interstitial or lymphatic spaces.² This is categorized according to the age of onset as congenital (Milroy disease), praecox (Meige disease), or tarda. Congenital lymphedema is typically present at birth or develops prior to the first year of life. It affects the lower extremities although the upper extremities and even the trunk or face may be involved. Cases may be sporadic or familial, and inheritance is classically autosomal dominant although recessive inheritance has been described.³ Lymphedema praecox (Meige disease) which is the most common form of primary Lymphedema, usually occurs in females and develops after puberty, during pregnancy or prior to the age of 35.^{1,4} On the other hand, secondary lymphedema is acquired obstruction of the lymphatics which results from tumor, surgery, post-

irradiation fibrosis, post-inflammatory scarring, filariasis, trauma, thyroid disease, obesity and chronic venous insufficiency.^{1,5} The classic presentation is of unilateral involvement of a lower extremity although involvement of both lower extremities and of the upper extremities is not uncommon.⁶ Low Level Laser Therapy (LLLT) is reported to have beneficial effects on cells and tissues in a broad range of conditions, including lymphedema, through encouraging formation of lymphatic vessels (lymphangiogenesis), promoting lymphatic flow and stimulating the immune system. LLLT employs low intensity wave lengths between 650-1000 nm in a scanning or spot laser form.^{7,8} Laboratory studies support the concept that LLLT can increase collagen production, alter DNA synthesis, reduce the expression of inflammatory markers, and enhance the function of damaged muscles and nerves.⁹ Lawenda et al. believe that the results are certainly intriguing and these trials should be validated with larger numbers of patients, varying laser parameters (wavelength, pulse duration, frequency, dose, and treatment schedule), and longer follow-up.¹⁰

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LLLT has been approved by the US Food and Drug Administration (FDA) for professional and self-treatment of lymphedema in postmastectomy breast cancer patients since 2006.¹¹ European Medical Laser Association believes that LLLT is a non-invasive, painless, athermal and aseptic therapy which efficiently restores functional ability and is almost free of side effects.¹²

Lasers are classified by US FDA based on different properties to classes 1, 2, 3A, 3B, 4 and 5, respectively from the lowest power in class 1 lasers (for example barcode readers and some types of LED or super-luminous diode therapeutic lasers) which do not affect tissues, to class 4 and 5 lasers that are very high powered and are surgical lasers that cut tissue. Most therapeutic lasers are classified class 3B and could affect the eyes and thus, protective eyewear should be worn. Class 3 infrared wavelengths A and B refer to near infrared or short wavelengths (A) and far infrared or long wavelengths (B). Class 1, 2 and 3 (A and B) lasers do not harm tissue.^{13,14}

No published study could be found reporting adverse effects associated with the use of any of the classes of therapeutic laser. Yousefi-Nooraie et al. (2007) in their Cochrane Review of LLLT reported that none of the seven studies with a total of 384 people reported any side-effects with the use of low level lasers.¹⁵ Similarly, the Brosseau et al. (2005) reported no side effects in 130 cases who received laser therapy for rheumatoid arthritis.¹⁶ In a RCT by Dundar et al. (2007) to study the effect of the GaAsAl LLLT on myofascial pain syndrome, no side-effects were observed.¹⁷ Gur et al. (2002) also reported no side effects in their randomized, single-blind, placebo-controlled

study to examine the effectiveness of Ga-As LLLT for fibromyalgia on 40 subjects.¹⁸

All the found reports were around the trial of LLLT on secondary forms especially post-mastectomy lymphedema and no result was found about the primary form of lymphedema praecox. This form of treatment was performed on a confirmed case of lymphedema praecox, and the result is reported below.

Case Report

A 15-year-old girl with confirmed diagnosis of right lower extremity lymphedema praecox referred to our private clinic was treated through LLLT, by means of Mustang-2000, a GaAs and GaAlAs diodes laser-therapy device, made in Russia. Treatment sessions were totally 24, each cycle containing 12 every other day sessions and one month free between the cycles. The estimation of needed dose for laser irradiation was calculated based on the reference textbooks.^{19,20} Irradiation time in each session was 15 minutes. Two probes of KLO3 and LO7 were used for 22 points on inferior, posterior and lateral sides of the leg and 30 seconds for each point. The same probes were also used for two points on the involved thigh, one minute irradiation for each point and on two points at lateral sides of umbilicus, one minute for each point. Two other probes of MLO1K were also used simultaneously to irradiate 14 points on the posterior side of affected leg, knee and groin, each point for two minutes. The characteristics of four used probes are described in Table 1.

The patient status in her involved leg at the beginning and the changes during the treatment are presented in Table 2.

Table 1. Four used probes for irradiation

Four Probes	Type of the Radiating Head	Optical Region	Wave Length (nm)	Operation mode	Radiation Power	Irradiation Time (per Site)	Frequency (Hz)
1	Probe LO7 (with annular magnet- zm75)	Infrared	890	Pulsed	80 W	30 sec.	3000
2	Probe KLO3	Red	630	Continued	10 mW	30 sec.	3000
3 & 4	Probe MLO1K	Infrared	890	Pulsed	70 W	2 min.	3000

Table 2. The changes of diameter in involved leg during the treatment

Site	Days	Days in the 1 st cycle of treatment					Free period		Days in 2 nd cycle		
		1	7	14	21	28	35	42	60	75	90
Diameter (cm) in right leg	Just below the knee	34.5	34.5	33.5	33	33	33	32	33	32.5	32.5
	15 cm below the knee	36.5	34.5	34.5	32	32	31.5	31	32	32	32.5
	Above the ankle	23.5	22	22	21	21	21.5	21	21.5	21.5	21.5

No side effect was appeared during the course of therapy and the course tolerance was good. No significant increase in circumference of involved leg was found following three months after finishing the course of treatment.

Discussion

Regarding the results of this report, LLLT could be helpful to treat lymphedema praecox and as the results showed, the circumference of involved leg was reduced significantly. Many studies have indicated the effectiveness of LLLT on the secondary forms of lymphedema, and also some opposing studies refute its effectiveness. No study was found about the effectiveness of LLLT on primary types of lymphedema through search engines of Google, Alta-Vista, Scirus and Search Medica by January 2011. Kaviani et al. found better reduction of edema in eleven women with postmastectomy lymphedema following LLLT comparing the control group treated with placebo irradiation.²¹ Carati et al. showed that the result after two cycles of LLLT on postmastectomy lymphedema cases was significantly better than placebo or one cycle of treatment, but it did not quite reach statistical significance at 3 months compared with the baseline measures.⁷ Regarding a review article by Moseley et al.,

three reviewed studies demonstrated continued improvement of lymphedema in arms following LLLT at three and six months after treatment sessions.⁸ Oremus et al. in a research project on different treatments of secondary lymphedema concluded that laser therapy was a sham treatment. They believed that although this type of intervention may satisfy the minimum regulatory requirements for showing the efficacy, the real world clinical utility of a novel treatment would best be demonstrated against an existing standard treatment and sham treatment may be an option if the experimental treatment is intended to be an adjunct to standard therapy (e.g., laser given in addition to MLD and compression bandaging, with one group getting real laser treatment, the other getting sham laser, and both receiving MLD and compression bandaging).²²

As the results of similar studies showed, the effectiveness of LLLT on secondary lymphedema is still controversial, which may be due to different methods of laser therapy administration. It seems that any definite statement around the effectiveness of LLLT on both primary and secondary forms of lymphedema needs more studies and regarding the result of our study, this treatment is recommended for lymphedema Praecox.

Conflict of Interests

Authors have no conflict of interests.

Authors' Contributions

Following referral of the case to MR's private office and consultation to MM, the confirmed diagnose and decision to treat the patient through LLLT was carried out by both the authors. Treatment and following was performed at MR's private office. Writing the article carried out by MM. Both the authors have read and approved the content of the manuscript.

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