



RESEARCH ARTICLE

THE EFFECT OF LASER ACUPUNCTURE VS ELECTRICAL STIMULATION ON PATIENTS WITH IDIOPATHIC BELLS PALSY

*¹Ahmed Abdrabou, ¹Yousry Mustafa, ²Khaled Amer and ¹Amr Eldeep

¹Department of Medical Applications of Laser, National Institute of Laser Enhanced Science, Cairo University

²Department of Rheumatology, Faculty of Medicine, Al-Azher University

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ABSTRACT

Background: Bell's palsy is an acute facial paralysis with unclear etiology that results in weakness or paralysis on one side of the face.

Purpose: This study aimed to determine the difference between the effect of Laser and (E.S) on facial nerve regeneration.

Subjects and method: Thirty patients of both sexes with Bell's palsy were included in this study. The patients were assessed by nerve conduction study (NCV) and electromyography (EMG). The amplitude was recorded from frontalis muscle at affected and unaffected side. These assessments were measured two times, firstly before treatment and secondly after treatment.

Results: there was statistically significant difference between both groups regarding electroneuromyography, latency, amplitude, duration area, motor unit, presence of positive sharp wave, presence of signs of regeneration. This difference was better in patients subjected to laser treatment.

Conclusion: There is significant difference in favor of Laser than electrical stimulation on facial nerve regeneration in Bell's palsy patients. Therefore, Laser is more effective than electrical stimulation in electroneuromyography, latency, amplitude, Duration, area, motor unit, presence of positive sharp wave and presence of sign of regeneration

INTRODUCTION

Bell's palsy is an acute facial paralysis with unclear etiology that results in weakness or paralysis on one side of the face. Many theories have been proposed for exact etiology such as viral infection (Herpes zoster), infections such as Lyme disease or inflammation due to tuberculosis that induce swelling of facial nerve that causes ischemia of the nerve tissue (Bleicher *et al.*, 1996). Patients with Bell's palsy referred for physical therapy usually receive electrical stimulation and facial exercise movements completed with maximum effort. Moreover, biofeedback training has been used in a wide range recently. However, the outcomes of such interventions were less than optimal and patients usually develop long-standing sequels (Novak, 2004). The ability of electrical stimulation (E.S.) protocols to improve skeletal muscle performance in healthy and dysfunctional muscle is widely accepted and routinely demonstrated in research studies as well as in clinical practice (Kjartansson and Lundberg, 2006). Laser is an acronym for light amplification of the stimulated emission of radiation; it is a form of phototherapy that involve the application of monochromatic light over biological tissue to elicit a biomodulative effect within that tissue (Kitchen and bazin, 2002).

*Corresponding author: Ahmed Abdrabou

Department of Medical Applications of Laser, National Institute of Laser Enhanced Science, Cairo University

Low level Laser therapy (LLLT) is the therapeutic application of Laser light at low intensity. LLLT increases metabolism at cellular level, causing accelerated ATP production and protein synthesis. New blood vessels are formed and collagen synthesis is enhanced. Vascular relaxation and increased skin microcirculation are noted following administration of LLLT (Karu, 2003).

Subjects and Method

This study is conducted at the outpatient clinic in Menuof general hospital in the period between 1/5/2013 and 1/2/2014. Convenient sample of 30 patients from both sexes aged 37±20.5 and suffering from chronic Bell's palsy participated in this study, they were assigned into 2 groups using selection card method. The patients were randomly assigned into two equal groups. Group (I) and group (II) each group consists of 15 patients. Group (I) received Laser in addition to soft tissue massage, while group (II) received Electrical stimulation in addition to soft tissue massage. Patients were diagnosed by neurologist as having chronic Bell's palsy with duration of 8 weeks or more.

Instrumentation used in this study were divided into two groups:

Assessment instrumentation (Electro diagnosis): Tonnie's Neuro-Screen plus. Essentially, the Neuro-Screen plus basic system consists of the following components: Computer-Incl.A/D Converter and control board, four-Channel AC amplifier (floating), tele panel (control panel), ink-jet printer and programmable Neuro-screen plus software with power supply 230v/50-60 Hz.

Treatment instrumentations: Laser Therapy: The Laser machine used is the new Laser group 3i1 which is a diode laser. Its type is Gallium-Aluminum-Arsenide with wavelength 650 nanometer and 50 mw power. Electrical stimulator unit: It was performed by using the ProStim et-300 multimodality stimulator; made in England. It was used to stimulate the facial muscles. Faradic stimulation is short duration interrupted direct current with a pulse duration ranging from 0.1 to 1ms and frequency of 50 to 100 HZ (Emam H. Elnagmy *et al.*, 2009).

Procedures: Measuring procedures (Electro diagnosis): Before application the face was washed with water and soap to remove sweat or any other interference. In case of Bell's palsy stimulating electrode was put on facial nerve trunk on the stylomastoid foramen, and the recording electrodes were put on the frontalis and nasalis muscles. Comparison between the unaffected and affected side was done to calculate the percentage of degeneration. This test was done pre and post treatment program for both groups. he was blinded about the cases. Points of stimulation: Active electrode on stylomastoid foramen and Recording electrodes on frontalis and nasalis muscles.

Treatment procedures: It was conducted at physical therapy Clinic in Menouf general hospital. All patients received the treatment for day after day (total number 12 sessions); all sessions were made by the author of this thesis unblinded.

Group A: Gallium-Aluminum- arsenide (GA-AL-AS) Laser parameters are 650 nm wavelengths, 50 mw and 7 minutes duration total time of session (one minute for each point) (Oron *et al.*, 2007). The patient's position was sitting on a chair with the probe in contact with the skin and physical therapist sitting beside the patient. One minute over the following acupuncture points for 60 sec per point:

GB12: In a depression posterior and inferior to the mastoid process,

GB14: On the forehead, directly above the pupil, 1 cun above the midpoint of the eyebrow,

EX-HN4: At the midpoint of the eyebrow, directly above the pupil,

UB2: In the hollow at the medial end of the eyebrow, in the supraorbital notch,

ST2: Below the pupil, in a depression at the infraorbital foramen,

LI 20: In the nasolabial groove, level with the midpoint of the lateral border of the ala nasi,

REN24: On the region of the face, in the depression in the center of the mentolabial groove. Regarding

Group B: The patient's position was sitting on a chair the Electrical stimulation used with the following parameter pulse duration from 0.1ms to 1ms and frequency 50 to 100 Hz, electrical stimulation intensity is determined till visible contraction appears. Electrical stimulation was applied by placing one electrode in front of the ear where the nerve trunk

Table 1. Comparison between Laser and faradic group regarding mean value of latency, amplitude, duration, mean value of area (pretreatment)

latency pre	N	Mean	Std. Deviation	T	p-value
Laser	15	3.0200	1.03040	1.558	0.131
Faradic	15	2.3933	1.16892		Not Sig.
Amplitude pre					
Laser	15	784.8267	682.47643	0.269	0.790
Faradic	15	832.1867	5.36015		Not Sig.
Duration pre					
Laser	15	11.1800	6.32492	0.069	0.945
Faradic	15	11.2933	.37315		Not Sig.
Area pre					
Laser	15	3.3028	2.56939	0.474	0.639
Faradic	15	3.6200	.33637		Not Sig.

Table 2. Comparison between Laser and faradic group regarding mean value of amplitude, duration, mean value of area (posttreatment)

amplitude post	N	Mean	Std. Deviation	T	p-value
Laser	15	1136.2533	571.61153	2.095	0.045
Faradic	15	827.0400	10.50801		Sig
Duration post					
Laser	15	9.2267	3.48086	-2.720-	0.011
Faradic	15	11.7067	.59698		Sig
Mean area					
Laser	15	5.2267	2.71305	2.276	0.031
Faradic	15	3.6200	.33637		Sig

is present, while the other electrode was placed on the stimulated muscle. Electrical stimulation was applied for 10 minutes over each of the following MS (Frontalis and Nasalis).

RESULTS

The purpose of this study was to compare between the effect of Laser and electrical stimulation on functional activity and nerve conduction velocity in patients with Bell’s palsy.

Lowe *et al.*, (1994) also agreed with this study and had shown that LLLT stimulation of normal peripheral nerves modified the normal parameters of peripheral nerve action potential and nerve excitability. The results of this study agree with Shelley *et al.*, (2007) who stated that Laser treatment had improved functional recovery in nerve. The possibility that, in-vivo, Laser therapy irradiation can directly enhance the process of axonal regeneration is suppo Ailioaie *et al.*, (2004) made a systematic examination of the influence of Low Level Laser

Table 3. Comparison between Laser and faradic group regarding mean value of Electroneuromyography (pre and post)

Electroneuromyography Pre	N	Mean	Std. Deviation	t	p-value
Laser	15	35.8667	19.14183	0.918	0.366
Faradic	15	31.2000	4.58569		Not Sig.
Electroneuromyography post	N	Mean	Std. Deviation	t	p-value
Laser	15	45.8667	18.99574	3.409	0.002
Faradic	15	29.0000	2.53546		H Sig.

Table 4. Comparison between Laser and faradic group regarding mean value of sign of regenerationpre andposttreatment

			sign of regeneration pre		Total	Pearson Chi-Square	p-value
			not present	Present			
Pre Treatment	laser	Count	6	9	15	0.144	0.705 Not Sig.
		%	40.0%	60.0%	100.0%		
	Faradic	Count	5	10	15		
		%	33.3%	66.7%	100.0%		
Total		Count	11	19	30		
		%	36.7%	63.3%	100.0%		

			sign of regeneration post		Total	Pearson Chi-Square	p-value
			not present	present			
Group	Laser	Count	1	14	15	11.627	0.001 H Sig.
		%	6.7%	93.3%	100.0%		
	Faradic	Count	10	5	15		
		%	66.7%	33.3%	100.0%		
Total		Count	11	19	30		
		%	36.7%	63.3%	100.0%		

There was no statistically significant difference between both groups regarding demographic data(age,gender, side of affection), There was no statistically significant difference between both groups regarding motor unit ,presence of positive sharp wave, signs of regeneration, mean value of Electroneuromyography, mean value of latency, amplitude, duration (pretreatment).

DISCUSSION

The purpose of this study was to compare between the effect of Laser and E.S on facial nerve regeneration in Bell’s palsy. The patients were assessed by nerve conduction study and by electromyography and Assessment performed twice, before and after the course of sessions. Data obtained from this study showed that laser is better than electrical stimulation in patients with chronic bells palsy. These results came in agreement with another study aimed to investigate and compare the effects of high intensity laser therapy (HILT) and low level laser therapy (LLLT) on the treatment of patients with Bell’s palsy. The result showed that both HILT and LLLT significantly improved the recovery of patients with Bell's palsy. Moreover, HILT was the most effective treatment modality compared to LLLT and massage with exercises. Thus, both HILT and LLLT are effective physical therapy modalities for the recovery of patients with Bell's palsy, with HILT showing a slightly greater improvement than LLLT (Alayat *et al.*, 2014).

Therapy (LLLT) in the regeneration of nerves in children, diagnosed with facial asymmetry, brachial plexus, or radial nerve injuries. The final analysis clearly indicates the validity of this new treatment technique, as 87.5% of the patients treated with Laser displayed a complete recovery, reported to only 60% of the patients in the control group and that results confirm the results of this study. On the other hand, the present study disagree with Quinn et al. (2003) who stated that no rigorous evidence that Laser treatment was effective in 21 patients with Bell’s palsy.

Conclusion

There is a significant difference between Laser acupuncture and electrical stimulation effect on Bell's palsy (8 weeks after injury) in latency, amplitude, axonal loss and EMG in direction that favor the use of laser in treatment of bell’s palsy.

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