Treatment of Cutaneous Leishmaniasis by CO_2 Laser and Er:YAG Laser

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ABSTRACT

Background: Cutaneous Leishmaniasis is an endemic disease in Iraq, it persists for long periods and heals with disfiguring scars, many treatments have been suggested for this disease.

Objective: To compare the effect of CO_2 laser with Er:YAG laser in treatment of acute cutaneous Leishmaniasis.

Methods: This is a prospective interventional randomized, clinical study was done on 42 patients with 51 lesions in two groups evaluated in Tikrit and Baghdad city.

The patients in group A underwent one session of fractional CO_2 laser for treatment of cutaneous Leishmaniasis and the patients in group B underwent one session of Er:YAG laser. All cases were evaluated according to "Sharquie's modified leishmaniasis score to assess the objective response to topical or systemic therapy". The data collected and analyzed by Chi-square and P-value.

Results: There were 19 patients with 22 lesions in group A and 23 patients with 29 lesions in group B. The mean age was 37.4 ± 9.82. Our results show there was no statistically significant difference between cure rates of both groups. The cure rate of group A was 95.5% and that of group B was 93.2%.

Conclusions: Cutaneous Leishmaniasis can be treated effectively with CO_2 laser and Er:YAG laser.

Keywords: CO_2, Er:YAG, Leishmaniasis.

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Cutaneous Leishmaniasis (CL) is a zoonotic disease caused by protozoal infestation of the Leishmania. The disease is endemic in Iraq and other countries in the Middle East, with different frequencies, sometime reaching an epidemic state[1,2].

The cutaneous leishmaniasis is a self-healing disease but spontaneous cure may take several months or even causing serious disability invariably leaving the patient permanently scarred, a stigma which can cause serious social prejudice[3].

Cutaneous leishmaniasis is divided into two subsets based on the geographic region where the infection is acquired: Old World and New World. These two groups differ with regard to the causative organisms, vectors, reservoirs, clinical presentation, and prognosis.

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Both Old World and New World cutaneous leishmaniasis usually begin as a small, well- circumscribed papule at the inoculation site after the incubation period which is relatively short (1-4 weeks) for wet or rural type and longer (2-8 months or more) for dry or urban type[4].

Although CL is a self-limiting disease, it is disfiguring, the duration of the disease may be long and may persist for several months or even years. Therefore, the major objectives in the treatment of CL are to shorten the duration of the disease, improving the cosmetic results of its scar and to save the patients from the psychological suffering, if the lesion stayed for a long time[5]. Many factors may affect the outcome of the treatment of CL which include, severity of the disease, the species of the parasite and its susceptibility to the drugs, nutritional state of the patients, the immunity of the patients and presence of intercurrent disease and the site of the

lesion of CL that would determine the type of therapy[6].

Ablative fractional resurfacing can be performed with carbon dioxide, Er:YAG devices. There are many devices available from many well-known laser manufacturers. Differences in devices are the mode of spot placement-scanning versus stamping, size of holes (width and depth) created, and power output of devices. Difference is between fractional carbon dioxide system, fractional Er: YAG system are similar to their full field counterparts in that the carbon dioxide system causes more residual thermal damage.

Newer Er: YAG systems have variable pulse widths, which cause carbon dioxide like thermal damage. Re-epithelialization is quicker than with full field ablation and recovery time varies from hours to a few days depending.

The mechanism of action of carbon dioxide and Er: YAG lasers in cutaneous leishmaniasis is specific thermolysis of infected tissue without significant side-effects in a normal tissue. The lesion heals within 4-5 weeks with quite acceptable cosmetic results.

Babajev et al. used carbon dioxide laser for treatment of cutaneous leishmaniasis in 108 patients in Russia. The treatment duration was reduced 1.5 fold in comparison with other treatments, there were good cosmetic results and all the patients were cured within 15-30 days[7].

Methods

This interventional randomized, clinical trial was conducted in private clinics, Tikrit and Baghdad city, between October 2017 and April 2018.

A total of 42 patients with 51 lesions of typical acute CL, had been enrolled in this study, 39 (%76.4) lesions were dry type and 12 (23.6%) lesions were ulcerated types. The duration of lesions ranged from 4-12 weeks. The diameter of the lesion ranged from 1 to 4 cm.

Skin examination was performed including the site, diameter, type of lesion and regional lymph node examination. Patients with following criteria were excluded from this study: Pregnancy, breast-feeding, chronic disease, immune-suppressed condition like diabetes mellitus, lesion on cartilage (above nose and ear), chronic recidivans, and tumid lupus types of leishmaniasis, lesions more than 5 cm in diameter, or lesion close to eyes patients who received anti-leishmanial treatment either local or systemic. Lesions of more than 12 weeks duration were excluded from study because of the possibility of self-healing, and the age of patients less than 5 years old.

After full explanation to each patient about the nature of disease including its coarse, complications and prognosis, treatment modalities and their complication, verbal and written consent were taken.

According to the therapy, the patients were divided into two groups: Group A; treated by CO_2 laser included 19 patients with 22 lesions treated by CO_2 laser (unixel RF, S. Korea) and (E. CO_2, Korea) laser with articulated mirror arm and hand piece, wavelength is 10600 nm, fractional mode، 1-30 cm^2 spot size, and maximum power 30W.

Group B; treated by Er:YAG laser included 23 cases with 29 lesions treated by Er:YAG (Action II, S. Korea) wavelength is 2940, fractional mode, 1-7 cm^2 spot size and 50W maximum power.

After confirmed diagnosis, the lesion was cleaned and sterilized by using 70% spirit solution. Patients given a local anesthetic cream (EMLA or Lidocain 10.5%) or inject 2% lidocaine around the lesion.

After selection of suitable pulse form by scanning using a focused, non-contact laser beam and two pass, when the procedure was complete the lesion covered with fusidic acid ointment.

Patients received single laser treatment session and observed every 2 weeks.

Scoring was done by using Sharquie's modified leishmania score to assess the objective response to topical or systemic therapy, (Table 1)[8].

Statistical analysis was done using chi square were used to compare between grades of responses between the two groups, P value ≤ 0.05 was considered significant.

Table-1:" Sharquie's Modified Leishmania score to assess the objective response to the topical or systemic therapy"

Score	Change in the color of lesion	Reduction rate in the diameter of lesion color	Reduction rate in the induration of lesion	Reduction rate of ulcer/crust
4	Bright red	-	-	-
3	Red	0-25%	0-25%	0-25%
2	Dusky red	>25%-50%	>25%-50%	>25%-50%
1	Dark brown	>50%-75%	>50%-75%	>50%-75%
0	Light brown	>75%/ clearance	>75%/clearance	>75%/ clearance

Results

There were twenty-two females and twenty males, with a female to male ratio of (1.1:1) and their ages ranged from 5-60 years with mean ±SD of (37.4±9.82) years.

Statistically, there was no significant difference between the two treated groups, regarding the number of the ulcerated and the dry lesions in each group, where, $\chi 2=1.42$ and P value < 0.05. The most common sites of body that frequently affected were the upper extremities with 27 lesions (52.94%), then the lower extremities with 20 (39.22%), while in neck with one lesion (1.96%), lastly the face with three (5.88%) lesions.

Group A: A total of 19 patients with 22 lesions treated with CO_2 laser, 15 (68.18%) lesions were dry type and 7(31.82%) lesions were ulcerative. So the total cure rate were seen in 21 (95.5%) lesions. In all clinical cured lesions, there were minimum scarring at the site of lesions. There were no serious symptoms reported.

Group B: A total of 23 patients with 29 lesions treated by Er:YAG laser; 24 (82.75%) lesions were dry and 5(17.25%) lesions were ulcerative. The cure rate was 27 (93.2%) lesions, (Table 2).

All the side effects that occurred post-operatively in this trial were transient and disappeared within few days after treatment. There was no serious symptoms reported, a part from mild pain that occur in many patients treated with CO_2 laser but was tolerable. Hypopigmentation at site of lesion was noticed in one patient treated with Er:YAG laser.

In this study, a CO_2 laser and Er:YAG were used in fractional mode for ablation of lesions of CL. Six weeks post-operatively, complete or very good improvement occurred in 39 of the 42 treated patients . The patients' satisfaction with this treatment method was also impressive.

Table 2: Comparison between CO_2 and Er:YAG laser in treatment of cutaneous Leishmaniasis.

Treatment method	Results		Number of lesions
	Effective No. (%)	Ineffective No. (%)	
CO_2	21 (95.5)	1(4.5)	22
Er:YAG	27(93.2)	2 (6.8)	29

Discussion

These results correspond with research of Sharquie et al, AL-Rubaiee, Rahim and Tatar about thermal therapy, with less pain and shorter periods of healing time, and this advanced technology (laser) is rather than the hot water and infrared[9-11].

Similar good results were obtained by Babajev et al[12] in Russia, Asillian et al[13].

Higher success rates and lower complications observed here are probably due to the nature of fractional technology. However, more well- designed clinical trials are needed to confirm the potential benefits of this new technology.

Cutaneous Leishmaniasis is an important disease in the Third World and Middle East. The classic treatment for cutaneous leishmaniasis is pentavalent antimony, which is both toxic and expensive, so many patients in the Third World countries cannot afford it.

In conclusion; The result of this trial suggests that cutaneous Leishmaniasis can be treated effectively with CO_2 laser and Er:YAG laser, excellent cosmetic outcome, and short duration of healing.

References

1- Sharquie KE, Najm RA, Farjou IB, Al-Timimi DJ. Oral zinc sulphate in the treatment of acute cutaneous leishmaniasis. Clin Exp Dermatol 2001; 26;216.
2- Neouimine NI. Leishmaniasis in the Eastern Mediterranean Region. Eastern Med Health 1996; 2:94-101.
3- Desjeux P. Human leishmaniasis: Epidemiology and public health aspects. World Health Stat 1992; 45: 267-75.
4- Griffiths C, Barker J, Bleiker T. Chalm diseases. In: Rook's Textbook of Dermatology (8th ed.). John Wiley & Sons, Inc. 2015. P.1234-40.
5- Control of the leishmaniasis. Report of a meeting of the WHO Expert Committee on the Control of Leishmaniasis, Geneva, 22–26 March 2010. WHO Technical Report Series 949.
6- González U, Pinart, Reveiz L, Alvar J. Interventions for Old World cutaneous leishmaniasis.
7- George Hruza, Mathew Avram. Lasers and Lights, 3rd edition. 2013. P.72-79.
8- Sharquie K, Noaimi A, Al-Salam W. Treatment of acute cutaneous Leishmaniasis by oral zinc sulfate and oral ketocanazole singly and in combination. Journal of Cosmetics, Dermatological Sciences and Applications 2016; 6: 105-15.
9- Sharquie KE, Al-Mashhadani SA, Noaimi AA, Al-Zoubaidi WB. Microwave thermotherapy; New treatment for cutaneous Leishmaniasis. Our Dermatology online 04/2015; 6(2): 125-9.
10- Al Rubaiee AK. Infra-red therapy of cutaneous Leishmaniasis (Baghdad Boil). Diploma dissertation, college of Medicine, University of Baghdad 1990.
11- Rahim GF, Tatar IH. Oriental sore in Iraq. Bull Endm Dis 1966; 8:29-54.
12- Babajev KB, Babajev OG, Korepanov VI. Treatment of cutaneous leishmaniasis using a carbon dioxide laser. Bull world Health Organ 1991; 69(1):103-6.
13- A. Asillain, A. Sharif, G. Faghihi, Evaluation of CO_2 laser efficacy in the treatment of Cutaneous Leishmaniasis. International Journal of Dermatology 2004;43:736-8.

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