Iraqi J. Laser, Part B, Vol.12, pp. 29-32 (2013)

IRAQI JOURNAL OF LASER

Treatment of Spider Veins Using 810 nm Diode Laser

Abdulhadi M. Muhsin (1) **Ali S. Mahmood** (2) and **Mohammed A. Ali** (1)

(1) *Ministry of Health, Al-Yarmook Hospital, Baghdad, Iraq*
(2) *Institute of Laser for Postgraduate Studies, University of Baghdad, Baghdad, Iraq*

(Received 27 November 2012; accepted 8 May 2013)

Abstract: Spider veins are a common aesthetic problem mainly in females , the conventional method of treatment is by microsclerotherapy (injections) but laser therapy has become increasingly efficacious and a convenient method for treatment. The present study was performed to investigate the effectiveness and safety of pulsed diode laser (810nm) by doing thermal photocoagulation. Ten patients with lower limbs spider veins were included in this prospective study. They were treated with a repetitive pulsed diode laser in non contact technique using the following laser parameters (wave length 810nm,power 1 W ,pulse duration 0.1 s., pulse interval 0.5 s, spot diameter 4mm ,power density 7.9 W/cm^2). Laser therapy was performed on day zero and day fourteen. Clinical assessments were carried out before laser therapy and immediately after the first laser therapy, after 2 weeks, 4 weeks, and 6 weeks. The procedure was performed without using any type of anesthesia. Results showed that there was a remarkable improvement for all patients after the first treatment and after the second treatment. Only six patients showed a complete disappearance of the spider veins with absent peroperative and postoperative pain and complications, within short operative time in comparison with the microsclerotherapy. So the repetitive pulsed diode laser therapy (810nm) is an effective and safe treatment option for lower limbs spider veins. It's recommended that larger numbers of cases to be done to allow for a proper statistical analysis and a longer follow up period to assess the recurrence rate.

Introduction

Spider leg veins are common finding on the lower limbs. About 30-40 % of adult develop these acquired leg telangiectases. The most important risk factor is increasing age (although a few people develop them when they are young). Chronic venous insufficiency and pregnancy are other known risk factors. (Bernstein 2001, Thibault 1990, Wollina 2003).

The semiconductor pulsed diode laser (810 nm) are particularly well suited for clinical applications. Treatment operate on the principle of selective photothermolysis which combines selective absorption of light energy by the oxyhemoglobin in the leg veins with suitable pulse duration that correspond to the thermal relaxation time of the target . Oxyhemoglobin absorbs the laser energy transferring heat to the vascular epithelium and denaturing the vessel wall. At this wavelength, there is less energy absorbed by the competing chromophore (melanin) than when shorter wavelength are used. (Dover 1999, Bruce 1998 , Narurkar 1999).

Laser treatment is used particularly for the kind of minuscule veins. The laser light damages the tiny blood vessels which then gradually disappear over few weeks. Each pulse deals with only a small area at a time. It needs to be strictly targeted. Some small areas can be treated in one session but larger areas may require number of visits (Bruce Campbell 2006).

Material and Methods

The laser system used was a diode laser. It essentially incorporate a class IV GaAlAs (Gallium aluminum arsenide) diode laser emitting at a wave length range of 790-830nm (near infrared), with an output power at laser aperture ranging from 0.5-15 W, Table 1.

The aiming beam is a visible diode 635-660 nm (red beam) with a power of 4mW (class III diode laser) at laser aperture. The laser power is delivered to the treatment site by means of a flexible optical fiber end with a hand piece (probe)

Diode laser (810 nm) in a repetitive pulse with an optical fiber (core size 600 µm) ending with a hand piece (probe) were used to treat the spider veins in a (non contact) technique of (2mm) away from the skin. The tip of optical fiber was held perpendicular to the skin and moved in a low speed at a rate of (1cm/min).

The total exposure time for each patient was entirely dependent on the length of spider veins under treatment (the average exposure time was (15 min.).

Table 1: Laser parameters used in the study

Wavelength	**810 nm**
Power	1 W.
Pulse duration	0.1 s
Pulse interval	0.5 s
Spot diameter	4mm
power density	7.9 W/cm^2

Two laser courses were applied at day zero and day fourteen (only two female patients received one course of laser treatment), clinical assessment were carried out immediately after first laser therapy, after 2 weeks, after 4 weeks and after 6 weeks. Prior to laser therapy patients asked to shave the area of spider veins (if hair is present, it will absorb the laser energy and causing discomfort), no topical anesthetic agent was utilized , no compression bandages or support stocking were worn post laser therapy . All patients were advised to avoid sun exposure of treated area two weeks following laser treatment in order to minimize the appearance of hyperpigmentation.

Patients was discharged immediately after laser therapy without any medication and asked to attain the clinic for follow up.

Evaluation criteria that had been considered to evaluate the results of this study include:

-The ease to operate.
-Operative time.
-Per and post operative complications.
-Healing time
-Degree of spider veins disappearance.

Ten patients completed the study, two patients received only one session of laser treatment and eight patients received two sessions of laser treatment.

Results

For six patients there was a 60% complete disappearance of the spider veins and there was an improvement of 40% for four patients (two of them with one session of laser treatment).

Vessel clearance improved with time after laser treatment and the best result was observed after the second session of laser treatment.

All patients tolerated the procedure without anesthesia. The results are listed in Table 2.

Table 2: The results after laser therapy

Case no.	**gender**	**Age (year)**	**No. of laser session treatment**	**Degree of improvement**
1	*F	30	2	Complete disappearance
2	F	32	2	Complete disappearance
3	F	33	1	improvement
4	F	35	2	Complete disappearance
5	F	38	2	Complete disappearance
6	F	40	2	Complete disappearance
7	F	45	1	improvement
8	F	50	2	improvement
9	F	54	2	improvement
10	M**	60	2	Complete disappearance

*: female**: male

Regarding the adverse effects, there was a mild discomfort or mild burning sensation (tolerable) in almost all patients, no purpuric reaction, no blistering, no scarring or pigmentary changes were observed at the end of follow up for all patients.

The average time taken for completing the procedure was (15 min.), which is shorter than

the time for conventional therapy (which usually takes more than 30 min.) .There was no need for hospitalization, none of the patients encountered any immediate preoperative or postoperative complications.

Patients did not require any analgesic and can resume their routine activities immediately post operatively. There was no recurrence detected during the follow up period which was 6 weeks.

Discussion

The application of laser in general surgery has advanced rapidly within the last 20 years. One aspect at which laser has been useful is for photocoagulation in the treatment of different types of varicose veins. The irreversible laser coagulation needs an intravascular temperature between (45^{o}C and 100 ^{o}C) , the extent of which depend on the optical and thermal properties of the treated tissue as well as on laser parameters used.(U Wollina 2003)

Laser therapy of spider lower limbs veins has become of increasing interest. In the past yellow pulsed dye lasers have been used with an improved selectivity to blue argon laser reducing the non-specific absorption by melanin. (U Wollina 2003, Hercogova 2002, Weiss 2002)

The coagulating effect of yellow laser, however is limited to a thickness of less than 10µm, in the case of vessels with a diameter greater than 0.1µm, yellow lasers are less effective since coagulation remains incomplete. (Mccoy 1996)

Near-infrared (NIR) laser offers advantages compared to yellow dye or argon laser. The epidermal melanin absorption decreases with longer wave length. This diminishes the spread of light and allows the treatment of deeper- lying vessels.

Since most spider lower limbs veins are of diameters 0.3-2 mm, with reticular veins up to 3mm, the use of NIR laser allow more successful therapy. (U Wollina 2003)

In one study, patients with spider leg veins were treated with the long pulse frequency-doubled (Nd): YAG laser (532nm) with a cooling device. 73% of patients had greater than 50% improvement after one treatment. 83% were seen with better resultsafter a second treatment (U Wollina 2003, Bernstein 1999 , Sadick 2001), but unwanted side effects include pain, hyperpigmentation , scarring and blistering was happened. (Eremias 2001, McMeekin 1999, Omura 2003)

In another study, one treatment with Nd: YAG laser (1064nm) achieved a clearance of more than 75% in two third of small vessels measuring 1to 3 mm in diameter but a skin biopsy taken for analysis from the treated area revealed perivascular haemorrhage with thrombi. (U Wollina 2003, Omura 2003)

So a group of (810nm) diode laser (5-250 ms pulse duration) have been used with encouraging results in the treatment of superficial and deep small to medium sized leg telangiectasias, neither scarring nor pigmentary or purpuric side effects were noted. (Varma 2000)

Comparing the results of laser therapy of spider lower limbs veins with (injection) microsclerotherapy shows that with the using laser these advantages will be achieved:

Shorter operative time.

Shorter hospital stay.

Mild or no postoperative pain.

No postoperative complications detected.

Shorter healing time.

No postoperative compression bandages were needed.

It seems that the parameters chosen for photocoagulation were safe with no apparent damage to nearby tissues and no complications detected in the treated area.

Conclusions

Laser therapy can be considered a first line approach for superficial, fine caliber spider vein and laser therapy is an excellent option for patients who are fearful of needles of sclerotherapy.

The results suggest that the 810 diode laser is safe, well tolerated, with low frequency of unwanted side effects and effective treatment for spider veins.

Within the chosen parameters for application there was:

- Short operative time.
- No preoperative or postoperative pain.
- No evidence of damage to the surrounding tissue.
- No evidence of complications.

However, the initial results of this treatment technique of spider veins are encouraging.

References

Bernstein EF, Brown DB, Black J., (1999) "(Treatment of spider veins using a 10 millisecond pulse duration frequency–doubled Nd-YAG laser)". Dermatol surg.;25:316-20.

Bernstein EF. (2001), "(Clinical characteristics of 500 consecutive patients presenting. for laser removal of lower extremity spider veins)", Dermotolsurg; 27:31-3.

Bruce Campbell, (2006), "(Understanding varicose veins)" .3rd Ed . The British medical association.

Dover, Jeffrey S. (1999), "(The role of lasers and light sources in the treatment of leg veins)". Dermatol surg.;25-328-336.

Eremias. (2001), "(Treatment of leg and face veins with acryogen spray variable pulse width 1064nm Nd:YAG laser. J cosmetic laser ther.)"; 3:147-53.

Hercogova J. (2002), "(laser treatment of cutaneous vascularlesions: face and leg telangiectases)". J Eur Acad Dermatolvenereol;16:12-18.

Katz Bruce. (1998), "(Laser therapy and sclerotherapy in the treatment of large and small spider veins)". Journal of cosmetic Dermatol. Sep.;34-41.

MccoyS, Hanna M. "(An evaluation of the copper-bromide laser for treating telangiectasia)". Dermatol surg.; 22:551-7.

McMeekin To. Treatment of spider veins of the leg using a long–pulsed Nd : YAG laser at 532nm. J cutan laserther 1999;1:179-80.

Narurkar ,VIC. Laser therapy for lower extremity telangiectasias. Cosmetic Dermatol Jan. 1999:12-14.

Omura NE. (2003), "(Treatment of reticular leg veins with a 1064nm long pulsed Nd:YAG laser)". J Am Acad Dermatol ;48:76-81.

Sadick Ns. (2001), "(Long –term results with a multiple synchronized-pulse 1064 nm Nd:YAG laser for the treatment of leg venulectases and reticular veins)". Dermatol surg.;27:365-9.

Thibaultp, Bray A. (1990), "(Cosmetic leg veins: evaluation using duplex venous imaging)". Dermatolsurgoncol;16:612-18.

Varma S. (2000), "(laser therapy of telangiectatic leg veins: clinical evaluation of the 810nm diode laser)". Journal of clin Exp Dermatol;25:419-22.

Weiss RA. (2002), "(Laser surgery of leg veins)". Dermatolclin; 20: 19-36.

Wollina. (2003), "(Response of spider leg veins to pulsed diode laser (810nm): a clinical, histological and remission spectroscopy study)". Journal of cosmetic and laser therapy; **5**.(3), 154-162

علاج الاوردة العنكبوتية بأستخدام الليزر شبه الموصل (الدايود) 810 نانومتر

عبد الهادي ماجد محسن [1] **علي شكر محمود** [2] **محمد عباس علي** [1]

(1) وزارة الصحة ، مستشفى اليرموك التعليمي ، بغداد ، العراق
(2) معهد الليزر للدراسات العليا، جامعة بغداد ، بغداد ، العراق

الخلاصة: تعتبر الاورده العنكبوتيه من الحالات الشائعه وخاصة عند النساء والطريقه التقليديه في علاجها بأستخدام حقن المواد المصلبه اجريت هذه الدراسه في مستشفى اليرموك التعليمي / بغداد للفتره من شهر ايلول /2009 لغاية شهر كانون الثاني /2010 وكان الهدف تقييم مدى الاستفاده من جهاز الليزر شبه الموصل (الدايود) 810 نانومترفي علاج المرضى الذين يعانون من الاورده العنكبوتيه في الاطراف السفلى ، تم اختيار عشرة مرضى يعانون من الاورده العنكبوتية وتم علاجهم بأستخام الليزر (الدايود) 810 نانومتر وبدون استخدام اي نوع من التخدير **النتائج :** اظهرت النتائج اختفاء هذه الاورده بصوره تامه في (60%) من المرضى و (40%) اظهروا تحسناً ملحوظاً(لم تختفي بصوره تامه) بعد ستة اسابيع من المتابعه ,وان الزمن اللازم لاجراء العمليه اقصر مقارنة بالطريقه التقليديه ولم يتم استخدام ادويه مسكنه للألم ولم تظهر اية مضاعفات خلال فترة العمليه وبعدها ولم تسجل حالة رجوع للأورده خلال فترة المتابعه. ان استعمال الليزر في علاج الاورده العنكبوتيه ذو نتائج مشجعه جدا. توصي الدراسه مستقبلا بزيادة عدد المرضى المعالجين بهذه الطريقه لغرض الحصول على تحليل احصائي مناسب للنتائج وتوصي بتمديد فترة المتابعه لتقييم حالات الرجوع ذات المدى المتوسط والطويل.