Australasian Journal of Dermatology

Australasian Journal of Dermatology (2012) **53**, 281–284 doi: 10.1111/j.1440-0960.2012.00948.x

CASE SERIES

Copper bromide laser for facial telangiectasia: A dose response evaluation

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ABSTRACT

Facial telangiectases are small dilated vessels that are visible on the skin surface. They are a cosmetic disfigurement for millions of people, making their treatment one of the most frequently requested procedures in dermatology. Several treatment choices are available, including a variety of lasers. The purpose of this study was to evaluate the results, using a copper bromide laser, of variable energy levels related to vessel size and location, including side effects, and to survey patient assessment of benefit and tolerance. Two groups of 19 patients were treated at 23 J/cm^2 and 28 J/cm^2, and 32 J/cm^2 and 38 J/cm^2, respectively. Only facial telangiectasias were treated. Benefit was seen at all energy settings. Little additional benefit was noted with energy increase alone, but it was noted with a second treatment. This study showed that the copper bromide laser is a very effective, safe, and well tolerated treatment for facial telangiectasia at all four tested energy levels.

Key words: copper bromide (CuBr) laser, facial telangiectasia, energy level.

INTRODUCTION

Facial telangiectases are small dilated vessels that protrude above the skin surface, making them visible to the eye. They can vary in size (0.1–3 mm diameter), location, colour (bluish to reddish), and pattern. Many patients have a genetic predisposition to facial telangiectases, while in others it is associated with various disorders, including connective tissue diseases, increased oestrogenic states, liver disease, photo-damage from sun exposure, prolonged steroid use, radiation therapy dermatitis, rosacea, surgical trauma and vascular genodermatoses.[1–3]

Millions of people worldwide are affected by facial telangiectases, and since they are difficult to hide with make-up, cosmetic disfigurement is the most common presenting symptom. Therefore, the treatment of facial telangiectases is the most common request in dermatology and cosmetic surgery departments.[1–5] Fine-wire diathermy and microsclerotherapy were the predominant treatments until about 25 years ago, when the use of lasers to photocoagulate the vessels was tested. Today, a variety of lasers, from continuous wave to dye lasers to solid-state lasers in the near infrared range, are available. With a number of factors including target chromophore, vessel size and depth, and vascular flow rate influencing which laser will be most effective in the treatment of a patient's facial telangiectases, a variety of lasers is necessary.[1–5]

The copper bromide laser, at 578 nm, has an ideal wavelength for treating cutaneous vascular disorders. There are a number of publications that describe the use and benefit, and the physics and tissue effects of this laser have also been previously reviewed.[1–11] In clinical practice, treatment is done using parameters based on training and on the observation of effect on tissue during the procedure. No published studies were found comparing the benefit (tissue response) at various energy levels. Therefore, we performed a study to evaluate the results of variable energy levels related to vessel size and location, including side effects, and to survey patients' assessment of benefit and tolerance.

MATERIALS AND METHODS

The study was approved by the institutional review board of our medical facility, and all patients provided consent for enrollment into the study, according to institutional policy and procedure. All patients were Fitzpatrick skin type I to III, and only facial telangiectasias were treated.

The nose, cheeks, and chin were separately evaluated. Vessel size was measured in 0.25 mm increments using a dermatoscope (EpiScope, Welch Allyn, Skaneateles Falls, NY, USA) and divided into small (up to 0.25 mm), medium (0.25 to 0.5 mm) and large (greater than 0.5 mm) diameter sizes. Preoperative and postoperative photos were taken with a Polaroid Macro 5 SLR camera (Polaroid, Cambridge, MA, USA) using fixed magnification and flash setting.

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Conflict of interest: None.

Submitted 26 April 2012; accepted 24 July 2012.

An antiseptic cleanser was used prior to the treatment. The eyes were protected with appropriate goggles and the treatment was done by tracing the beam along the vessel with no or a minimal overlap of pulses. To minimise study variables, no external cooling or topical anesthesia was used.

A copper bromide laser (Norseld, Adelaide, South Australia) was used at a 578 nm wavelength and a 0.6 mm spot size. The laser was set for operation at the maximum wattage and the pulse duration was adjusted in 5-msec intervals to obtain the desired energy. The interval between pulses was set at 200-msec for all treatments. Energy densities of 23 J/cm^2 and 28 J/cm^2 or 32 J/cm^2 and 38 J/cm^2 were used.

The study was done in two parts. In study part 1 (previously presented), [9,10] 19 patients were treated; 16 female and three male with an average age of 49 years (range of 26 to 70 years). The initial treatment was done at an average energy of 23 J/cm^2. The patients were seen and photographed for post-treatment comparison after 1 month. Any residual vessels at the time of this follow up were re-treated at an average of 28 J/cm^2. Photographic evaluation for comparison was again performed 1 month after the second treatment.

Study part 2 was conducted with a second unique set of 19 patients; 12 female and seven male with an average age of 47 years (range of 28 to 69 years). The methods used were the same, except that the initial treatment was completed at 32 J/cm^2 and the second treatment at 38 J/cm^2.

Four independent study evaluators separately assessed the photographs and rated the facial telangiectasia improvement as poor (0 to 25% clearing), fair (25 to 50% clearing), good (50 to 75% clearing), or excellent (greater than 75% clearing). Evaluation was done separately for the nose, cheeks, and chin for both the first and second treatments. Any dyschromia or textural scarring was noted at the time of the final evaluation, which occurred 1 month after the second treatment.

The patients were asked to make a similar evaluation of benefit and to rate the level of treatment discomfort as none, mild, moderate, or severe.

RESULTS

Results are reported in greater detail for those patients who received good or better results (good plus excellent) and those who received excellent results. The results of the chin and cheeks were analysed together because of the small number of chins evaluated. For those who ranked in the poor to fair range, a separate assessment was inconsequential.

In study part 1, after the first treatment (average 23 J/cm^2), 64% of patients had good or better clearing and 20% had excellent results. After the second treatment (average 28 J/cm^2), 79% of patients had good or better clearing and 38% had excellent results. In study part 2, after the first treatment (average 32 J/cm^2), 49% of patients had good or better clearing and 12% had excellent results. After the second treatment (average 38 J/cm^2), 77% of patients had good or better clearing and 27% had excellent results (Table 1).

Table 1 Results of clearing

	Study part 1		Study part 2	
	Post-1st treatment	Post-2nd treatment	Post-1st treatment	Post-2nd treatment
Good or better	64	79	49	77
Excellent	20	38	12	27

Table 2 Results by location

	Study part 2			
	After 1st treatment		After 2nd treatment	
	Cheek	Nose	Cheek	Nose
Good or better	69	43	100	76
Excellent	N/A	N/A	56	24

For results by location, the benefit was similar in study part 1 and part 2, and greater for the cheeks and chin than for the nose. In study part 2, good or better results were seen in 69% for the cheeks and 43% for the nose after the first treatment. After the second treatment, 100% had good or better results for the cheeks as compared to 76% for the nose. Excellent results were seen for 56% of the cheeks and 24% for the nose (Table 2).

There was little difference in results between the small and medium sized vessels after the first treatment in study part 1. For the second treatment, medium size vessels improved more for the nose, and small vessels showed slightly more improvement for the cheeks. Following the second treatment in study part 2, equivalent results were illustrated for the chin, having good or better results regardless of vessel size. However, the medium size vessels had excellent clearing on both the nose and cheeks (Figs 1, 2).

In both study part 1 and part 2, the second treatment yielded a greater degree of improvement for both the cheeks and nose than was noted for the simple increase in energy alone. The largest change was seen in study part 2 for both small and medium vessels on the cheeks. The least change occurred with the small vessels on the nose after the second treatment. This benefit is reflected in the results for increasing energy, but it is also true for the results by size and location.

In several cases, treatment response was rated as poor with < 25% improvement. In study part 1, results in 13 cases on the nose and one case on the cheeks were rated as poor after the first treatment, and nine on the nose and 1 on the cheeks remained rated as poor after the second treatment. In study part 2, nine treatment responses for the nose were rated as poor, and seven remained rated as poor after the second treatment.

In study part 1, a small number of vessels larger than 0.5 mm were treated with generally good results. The nose and cheeks are described together due to the small number

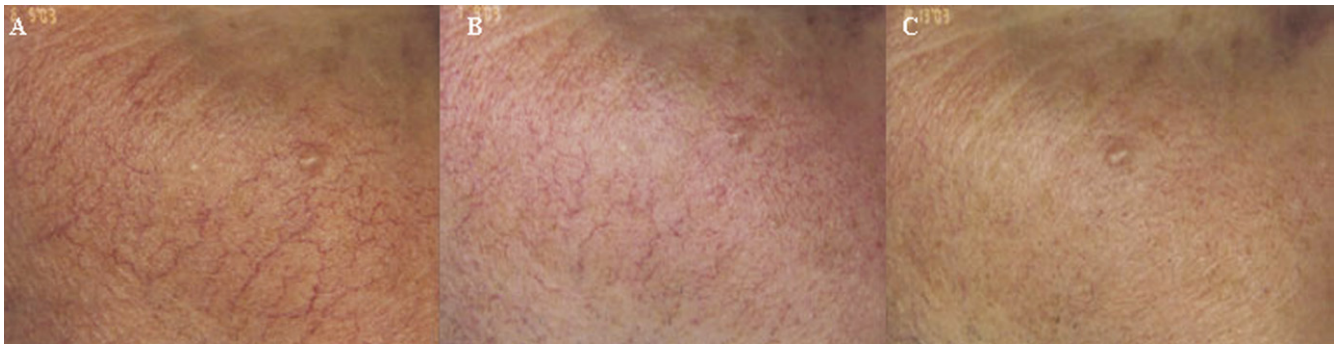

Figure 1 Example of clinical results showing cheek (a) before, (b) after first treatment and (c) after second treatment.

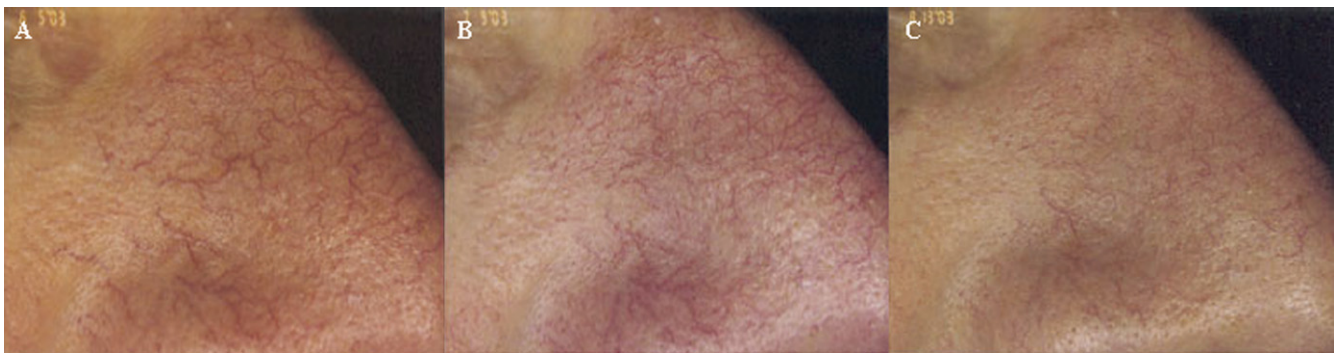

Figure 2 Example of clinical results showing nose (a) before, (b) after first treatment and (c) after second treatment.

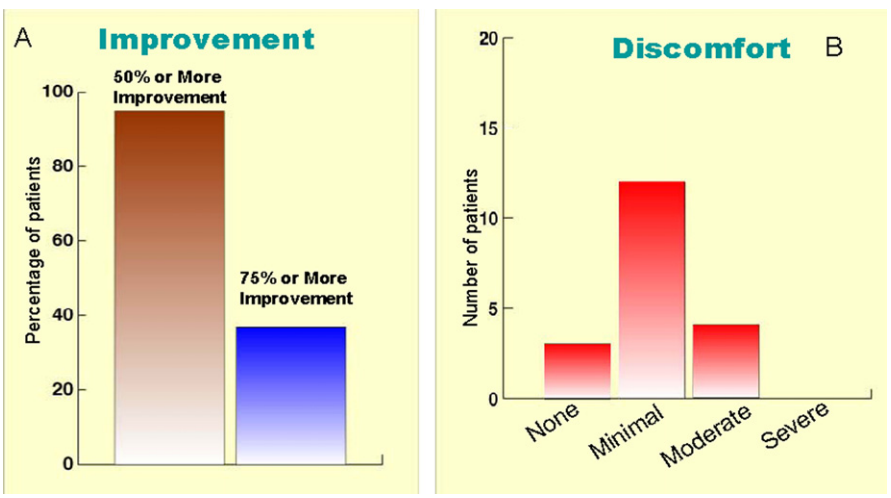

Figure 3 Patient evaluation of (a) treatment benefit and (b) level of treatment discomfort.

of patients. Overall, 50% had good or better results and about one-third had excellent results. There were not enough large vessels seen in study part 2 to make a separate assessment.

Patients rated their individual improvement on the same quartile percentage scale after the second treatment. In study part 1, four patients rated improvement as good, and six rated it as excellent. In study part 2, seven patients rated improvement as good, and seven rated it as excellent. Three patients in study part 1 and two patients in study part 2 rated the improvement as poor (Fig. 3a).

Most patients rated the treatment pain as minimal. Three patients in study part 1 and four patients in study part 2 rated the treatment pain as moderate; no patients rated it as severe (Fig. 3b). No patient discontinued treatment because of discomfort and all patients reported they would be willing to undergo the treatment again. No dyschromia or textual scarring was noted for any patient at the time of final evaluation.

DISCUSSION

When combining study part 1 and study part 2, overall 82% of patients had good or better clearing, and 31% had excellent results after two treatments. No additional benefit was seen with increasing energy alone, but there was a distinct benefit after the second treatment as rated by evaluators and patients in both groups. The reason for this is unverified, but continued improvement with additional treatments has been reported in previous publications.[1,5]

In this study, and in clinical practice, additional treatments are often done with an increase in energy, as indicated by the vessel response. It would be useful to know if additional treatments at the same energy would produce the same benefit. Also, based on theoretical calculations of vessel size and depth, wavelength and pulse duration may be as or more important for producing adequate vessel response than energy alone, after the threshold for visible vessel blanching is reached.

In clinical practice the energy level is selected by increasing the pulse duration until immediate vessel blanching is noted without visible effect on the epidermis. The results of this study support this practice. Increasing the pulse energy beyond the minimum necessary level introduces increased risk of scarring. Using the lowest efficacious energy level reduces risk and provides equal benefit.

Assessment by comparison of 'before and after' clinical photographs is a standard research method in clinical laser studies. This does involve a certain amount of subjectivity, which needs to be considered when interpreting the results. The use of four independent study evaluators is intended to provide less biased results. Also, the evaluations were broken down into smaller subsets relating to vessel size and location, which may not exactly reflect the experience in clinical practice with larger numbers. Another consideration is that the 1 month follow up after the second treatment may be too short of a time to allow for the proper assessment of the durability of the treatment results. A more accurate time point for assessment would be 3 months after the second treatment.

Compared to lasers with larger spot sizes, the small spot size of the copper bromide laser minimises exposure of normal tissue to the laser beam, and combined with required training and experience, typically results in no scarring or dyschromia, as in this study. However, scarring and/or dyschromia have been reported in other studies with the copper vapour laser.[1–5,7]

CONCLUSION

The copper bromide laser was equally effective at all energy levels used and provided additional improvement with repeat treatments. With proper provider training and experience, there is minimal to no visible tissue effect on the epidermis, and scarring is minimal or absent. Copper bromide laser treatment is quick and well tolerated by patients, and healing time is rapid. Considering these results, this study provides preliminary data for further studies of varying energy levels and treatment parameters, and corroborates previous reports that show the copper bromide laser is a safe and effective choice for the treatment of facial telangiectasia.

ACKNOWLEDGEMENTS

We would like to acknowledge the technical assistance of Kurt Lis, medical laser specialist and the A Ward Ford Memorial Institute for their support of this study. We also wish to thank Michele Henry of the Marshfield Clinic Research Foundation's Office of Scientific Writing and Publication for assistance in preparing this manuscript.

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