
Clinical Comparison of Sclerotherapy Versus Long-Pulsed Nd:YAG Laser Treatment for Lower Extremity Telangiectases

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BACKGROUND. Sclerotherapy has traditionally been considered the gold standard of treatment for leg veins, but patient fear of multiple needle injections and side effects of treatment have fueled investigation into other treatment alternatives. As a result, vascular-specific laser and light sources have been developed in an effort to treat these vessels with minimal morbidity and improved efficacy.

OBJECTIVE. To compare the clinical efficacy of leg telangiectasia treatment with sodium tetradecyl sulfate sclerotherapy to long-pulsed 1064 nm Nd:YAG laser irradiation.

METHODS. A series of 20 patients with size-matched superficial telangiectases of the lower extremities were randomly assigned to receive two consecutive monthly treatments with injectable sodium tetradecyl sulfate on one leg and long-pulsed 1064 nm

Nd:YAG laser irradiation on the other. Patients were evaluated by two masked assessors at each treatment visit and at 1 and 3 months after treatment to assess clinical improvement within matched sites.

RESULTS. Leg telangiectases responded best to sclerotherapy in fewer treatment sessions than to long-pulsed 1064 nm Nd:YAG laser irradiation. The incidence of adverse sequelae was minimal and equivocal in both treatment groups.

CONCLUSION. Despite recent advances in laser technology for treatment of lower extremity telangiectases, sclerotherapy continues to offer superior clinical effect in the majority of cases. Laser leg vein treatment appears to be most beneficial in patients with telangiectatic matting, needle phobia, or sclerosant allergy.

J. R. LUPTON, MD, T. S. ALSTER, MD, AND P. ROMERO, RN, BSN HAVE INDICATED NO SIGNIFICANT INTEREST WITH COMMERCIAL SUPPORTERS.

APPROXIMATELY 40% of women and 15% of men develop clinically apparent ectatic venules of the lower legs,¹ with more than half of them becoming symptomatic over time.² Because leg veins are located relatively deep in the dermis, with increased hydrostatic pressures, large luminal diameters with thick vessel walls, as well as decreased blood oxygenation, they are more difficult to eradicate than superficial facial vessels. The vascular anatomy of the legs is also unique in that superficial vessels are interconnected with deeper, reticular veins and thus usually require more extensive treatment even if obvious varicosities are not present.^{3,4}

Although sclerotherapy is considered the gold standard of leg vein treatment by most practitioners, it is associated with several limitations, including the possibility of systemic allergic reactions to the injected sclerosant, posttreatment ulceration, scarring, telangiectatic matting, and the need for multiple transcutaneous injections.^{5,6} A variety of different laser and in-

tense pulsed light (IPL) sources have recently been developed and have shown early promise in the treatment of leg veins up to 3 mm in diameter.⁷⁻¹¹

With its relatively long wavelength of 1064 nm and subsequent decreased absorption of energy by epidermal melanin, the long-pulsed Nd:YAG laser may best be able to penetrate tissue to a level deep enough to effect destruction of leg telangiectases.^{4,12,13} This study was conducted to compare the effectiveness of sclerotherapy versus long-pulsed 1064 nm Nd:YAG laser irradiation of lower extremity telangiectases.

Materials and Methods

Twenty women, ages 27–68 years (mean 45 years), skin phototypes I–III, with size-matched superficial leg telangiectases (diameter range 0.1–1.5 mm; mean 0.5 mm) were included for study. Patients with a prior history of lower extremity telangiectasia treatment, clinical evidence of severe vascular incompetence, on anticoagulant treatment, or those currently pregnant or breastfeeding were excluded from the study.

Patients were randomized to receive two treatments with a long-pulsed 1064 nm Nd:YAG laser (Varia, CoolTouch Laser Corp., Auburn, LA) to telangiectases on one leg and

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0.25% sodium tetradecyl sulfate (Sotradecol, Elkins-Sinn Inc., Cherry Hill, NJ) sclerotherapy to those on the other. Size-matched vessels on the thighs, knees, calves, ankles, and popliteal fossae received treatment by a single operator (J.R.L.). Laser treatments were delivered through a 5.5 mm collimated spot size at 1 Hz using fluences of 125–150 J/cm² (mean 135 J/cm²). A pulse duration of 25 msec was used for smaller vessels and a 50-msec pulse width was applied for vessels larger than 0.5 mm in diameter. Epidermal cooling was achieved with a cryogen spray of varying pre- and post-treatment durations depending upon the skin phototype of the patient (ie, longer precooling with darker skin phototypes) and the size of the vessel (ie, increased postcooling delay for larger vessels in order to effect full-thickness mural denaturation). Precooling durations ranged from 0 to 5 msec, postcooling durations ranged from 20 to 50 msec, and postcooling delays ranged from 5 to 20 msec. The end point of laser treatment was determined to be when either total contraction (visual elimination) of the vessel was effected or darkening of the vessel and/or adjacent tissue hyperemia was observed.

Size-matched vessels on the contralateral leg were injected with 0.25% sodium tetradecyl sulfate through a 30-gauge needle. A sufficient amount of injectable sclerosant was delivered to completely blanch the targeted vessels and all visible tributaries during the treatment session (range 2–10 ml). Graduated compression stockings of 20–30 mmHg were applied on the sclerotherapy-treated leg for 48 hours following treatment.

Photographic documentation and clinical improvement scores were determined 1 month after the first treatment session, and 1 and 3 months after the second treatment session by two masked independent assessors using a quartile grading scale of 0 = less than 25% improvement, 1 = 26–50% improvement, 2 = 51–75% improvement, and 3 = greater than 75% improvement. Side effects of treatment were also recorded at each treatment and follow-up visit.

Results

Clinical Improvement

Average clinical improvement scores were 1.7 for the sclerotherapy-treated leg and 1.1 for the laser-treated leg 1 month after the first treatment session (Figures 1–3). One month following the second treatment session, improvement scores of 2.8 and 1.8 were given for the sclerotherapy-treated side and the laser-treated side, respectively. Three months after the second treatment session, average improvement scores of 2.6 and 1.7 were given for the sclerotherapy-treated side and laser-treated side, respectively.

Side Effects

In general, both the laser treatments and the sclerotherapy were well tolerated by all patients, with no se-

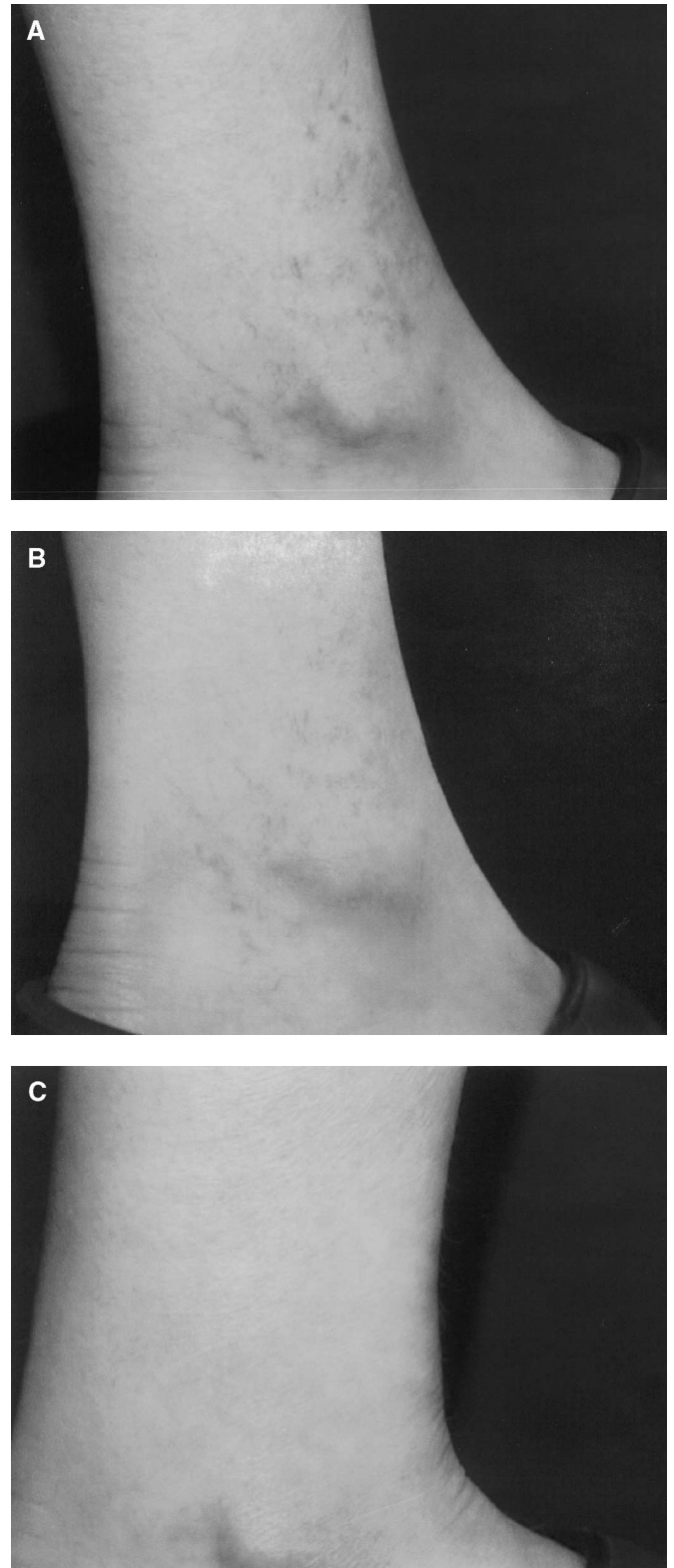


Figure 1. A) Medial malleolus with telangiectasias measuring 0.1–0.8 mm in diameter. B) One month after the first sclerotherapy session with 0.25% sodium tetradecyl sulfate solution. C) Three months after the second treatment with 0.25% sodium tetradecyl sulfate.

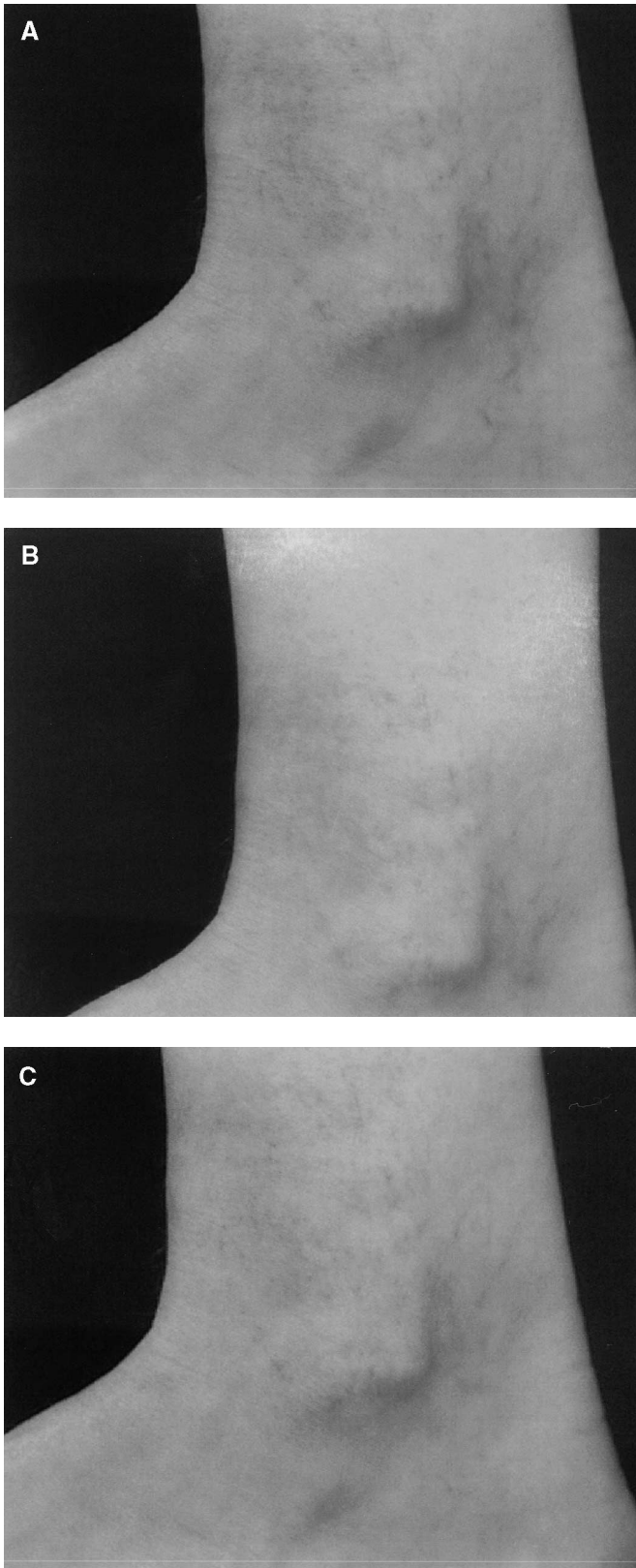
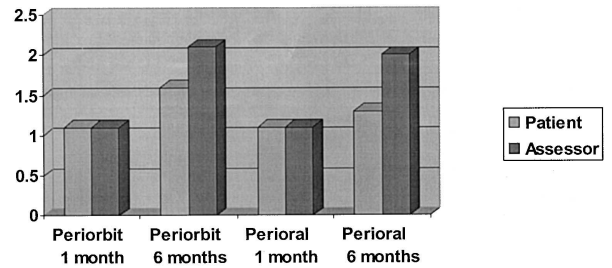


Figure 2. A) Contralateral ankle of the patient from Figure 2, demonstrating fine 0.1–0.8 mm diameter telangiectasias. B) One month after the first 1064 nm long-pulsed Nd:YAG laser treatment at 135 J/cm², 0 msec precool, 30 msec postcool, and 10 msec postcool de-



Grading: 1= <25%, 2= 26-50%, 3=51-75%, 4= >75% improvement

Figure 3. Clinical improvement scores.

rious adverse sequelae. Of the 20 patients treated, 70% ($n = 14$) reported mild treatment pain associated with both treatments. Transient local tissue erythema and edema lasting between 1 and 7 days were reported by 95% of patients ($n = 19$) on the sclerotherapy-treated side and by 75% of patients ($n = 15$) on the laser-treated side. Transient postinflammatory hyperpigmentation developed in two patients (10%) on the sclerotherapy-treated leg, both of whom had skin phototype III, but in no patients who received laser treatment. There were no cases of vesiculation, fibrosis, or scarring as a result of either treatment.

Discussion

Significant clinical improvement of leg telangiectasias was shown in all sites treated with either sclerotherapy or laser irradiation. Earlier vessel clearing was observed after sclerotherapy, with higher average improvement scores in sclerotherapy-treated areas at each follow-up visit. Posttreatment hyperpigmentation observed on the sclerotherapy side may have been a result of the relatively high concentration (0.25%) of sclerosant used and potentially could have been avoided with injection of a less concentrated solution (0.1%).

Given the fact that laser treatment of lower extremity telangiectasias is not associated with either improved clinical efficacy or decreased treatment pain compared with traditional sclerotherapy, its widespread use cannot yet be supported for this purpose. Although sclerotherapy is relatively inexpensive, it requires extensive clinical experience to achieve optimal results. The novice practitioner may find laser treatment easier to perform and may therefore initially prefer this method of treatment.

lay. C) Three months after the second 1064 nm long-pulsed Nd:YAG laser treatment at the same treatment parameters.

Patients with known allergy to sclerosant solutions or with severe needle phobias should avoid treatment with sclerotherapy. Likewise, patients who have developed postsclerotherapy telangiectatic matting would be good candidates for laser treatment. Until further refinements are made in laser technology, however, the majority of patients with lower extremity telangiectases appear to be best treated initially with sclerotherapy.

Conclusion

Lower extremity telangiectases can be effectively treated with either sclerotherapy or 1064 nm long-pulsed Nd:YAG laser irradiation. Sclerotherapy provides an earlier clinical response and is more cost effective, whereas laser treatment can be used in patients with telangiectatic matting, needle phobia, or sclerosant allergy.

References

- Engel A, Johnson ML, Haynes SG. Health effects of sunlight exposure in the United States: results from the first National Health and Nutrition Examination Survey 1971–1974. *Arch Dermatol* 1988;124:72–9.
- Weiss RA, Weiss MA. Resolution of pain associated with varicose and telangiectatic leg veins after compression sclerotherapy. *J Dermatol Surg Oncol* 1990;16:333–6.
- Somgen GM. Anatomy of the superficial venous system. *Dermatol Surg* 1995;21:35–45.
- Alster TS. Treatment of lower extremity telangiectasias. *Cosmet Dermatol* 2000;March:45–49.
- Duffy DM. Small vessel sclerotherapy: an overview. *Adv Dermatol* 1988;3:221–42.
- Weiss RA, Goldman MP. Advances in sclerotherapy. *Dermatol Clin* 1995;13:431–45.
- Kauvar ANB. The role of lasers in the treatment of leg veins. *Semin Cutan Med Surg* 2000;19:245–52.
- Dover JS, Sadick NS, Goldman MP. The role of lasers and light sources in the treatment of leg veins. *Dermatol Surg* 1999;25:328–35.
- Green D. Photothermal removal of telangiectasias of the lower extremities with the Photoderm VL. *J Am Acad Dermatol* 1998;38:61–8.
- Schroeter CA, Neumann HAM. An intense light source: the Photoderm VL-flashlamp as a new treatment possibility for vascular lesions. *Dermatol Surg* 1998;24:743–8.
- West TB, Alster TS. Comparison of the long-pulsed dye (590–595 nm) and KTP (532 nm) lasers in the treatment of facial and leg telangiectasias. *Dermatol Surg* 1998;24:221–6.
- Sadick NS. Long term results with a multiple synchronized-pulse 1064 nm Nd:YAG laser for the treatment of leg venectasias and reticular veins. *Dermatol Surg* 2001;27:365–9.
- Weiss RA, Weiss MA. Early clinical results with a multiple synchronized pulse 1064 nm laser for leg telangiectasias and reticular veins. *Dermatol Surg* 1999;25:399–402.