

MultiPlex for Leg Veins: Treatment Techniques and Observations

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Background and Objectives

Cynosure's Cynergy™ laser combines two optimal vascular wavelengths, the Pulse Dye Laser, considered the "gold standard" for treating vascular lesions, and a high powered 1064 nm Nd:YAG laser in one unit. In addition to these two lasers, the Cynergy offers a third option, the innovative MultiPlex™ feature, which allows the sequential delivery of these two wavelengths, enhancing its multifunctional capability.

MultiPlex provides a new concept for the treatment of vascular lesions. Using one laser wavelength to alter the absorption characteristics for a second, sequential wavelength, allows reduction in the treatment fluence of each while maintaining or improving outcomes and side effects profiles. MultiPlex provides better, non-purpuric, single treatment efficacy for telangiectasia and provides improvement to previously resistant vascular lesions¹. The application of MultiPlex to the treatment of leg veins is a natural extension of this unique technology.



Figure 1: MultiPlex treatment of a superficial leg telangiectasia (~0.3mm diameter) with deep reticular feed before (left) and following (right) two treatments.

Unwanted leg veins are a common staple of our practice. These vessels range from large, blue reticular veins to tiny red vessels and telangiectatic matting. In many cases laser therapy is the preferred method of treatment: for telangiectatic and post-sclerotherapy matting, small vessels can be difficult or impossible to cannulate, and certain patients who are needle phobic prefer laser treatment.

The term "leg vein" encompasses a wide variety of vessels, in size (0.2 mm red telangiectasia to 3 mm blue reticular vessels), location, and architecture. Optimal treatment of this variety of lesions requires an understanding of vascular anatomy, the proper laser, and proper tools for visualization.

Proper treatment of leg veins starts with an understanding of their architecture. While this provides a primer, I recommend a comprehensive education for those interested in becoming experts. Leg veins typically arise due to deep vascular incompetence. This incompetence leads to the distension of both superficial and deep vessels, which, depending on size and location appear as unwanted red, reddish, or blue vessels. It is important to recognize that for any superficial red vessel, there is a larger, underlying vessel feeding it. The most effective vascular treatments are performed by treating both superficial and deep components. It is also important to note that hydrostatic pressure leads to modest vessel flow rates which in turn lends to a MultiPlex medium interpulse delay choice. Leg veins < .2 mm in diameter account for a relatively small volume of heating and are generally not sources of bulk tissue heating that would likely result in epidermal injury.

In many cases, only deep vascular incompetence is evident, as purple or blue leg veins 0.8-3 mm in diameter. For these, the 1064 nm Nd:YAG laser is an effective therapy, with single treatment efficacy of about 66% typically using treatment fluences of 120 J/cm² and higher^{2,3}. For the smallest superficial telangiectasia, fine pink vessels 0.1-0.3 mm diameter, without obvious feeding vessels, we have found the short-pulsed (0.5 msec) Pulse Dye Laser [PDL] to be the most effective treatment available (80% exhibiting at least 75% clearance), although this is typically accompanied by purpura of one week or more⁴. PDL alone is also effective for larger vessels, up to about 0.8 mm diameter, however these treatments have a high rate of post inflammatory hyperpigmentation lasting months in addition to the transient purpura lasting weeks⁵. Fortunately, the Cynergy™ laser is capable of full performance

as stand-alone Nd:YAG, or PDL, and is capable of sequentially firing dual wavelengths in MultiPlex mode. In our practice, we have found that a MultiPlex treatment targeting both deep and superficial vessel components provides superior efficacy in the treatment of leg veins from 0.3-3 mm diameter. This is the method we will describe below.

By definition, telangiectasia are visually undesired vessels, and diagnosis is based on appearance. It seems intuitive to treat what is seen. However, this can lead to incomplete treatment or outright treatment failure. As described above, the obvious superficial telangiectasia are often fed by deeper vessels. While cross-polarized illumination can highlight telangiectasia, the superficial illumination does not allow visualization of deep reticular vessels. We have found that transillumination sources, such as the Veinlight™ allow visualization of these feeding vessels. Visualizing and targeting both deep and superficial components allows treatment of both, leading to improved clinical outcomes.

Technique

Effective treatment for leg veins with any leg vein laser starts with planning, and planning starts with a thorough examination. Not only is it important to determine the size, extent and location of the veins, but also to determine patient skin type, and history that may alter the expected response to laser treatment. Examination is conducted with both normal lighting and with transillumination. Important to note are the approximate size of both superficial and feeding vessels, as vessel size determines the appropriate laser pulse duration, and MultiPlex pulse group for treatment (Figure 2). In the majority of cases, we employ a multiple pass treatment, the first pass is to target the deeper feeding vessels, and the second targeting the smaller, superficial vessels. Treatments are always conducted in conjunction with SmartCool air cooling.

PDL Settings

The next step is to determine the purpura threshold(s) for the patient. Most skin type II to III individuals have purpura threshold in line with the threshold data published below (Figure 3). Dark skin types tend to have higher thresholds, and lighter skin lower thresholds. It is important to note that some patients, most commonly smokers, will exhibit unusually low threshold fluence for purpura. The proper PDL treatment fluence should be 1-1.5 J/cm² below the observed purpura threshold at the desired pulse duration for treatment. For treatment with a 40 msec pulse duration, the treatment fluence is typically 10-11

J/cm². For smaller vessels, at a pulsewidth of 10 msec the treatment fluence is typically 7.5-8 J/cm². Proper PDL settings for MultiPlex treatment should create a transient color change in the vessel, from red to blue, which dissipates or flows away within a few seconds.

Pulse Group	Pulse Group Definition PDL/YAG	Suggested Application(s)
1	0.5-ms PDL / 15-ms YAG	PWS (<0.1 mm dia)
2	2-ms PDL / 15-ms YAG	Mixed vascular
3	6-ms PDL / 15-ms YAG	Vessels <.2 mm dia
4	10-ms PDL / 15-ms YAG	0.2-0.8 mm dia
5	20-ms PDL / 20-ms YAG	0.6-1.0 mm dia
6	40-ms PDL / 40-ms YAG	0.8-1.2 mm dia
7	0.5-ms PDL / 40-ms YAG	Developmental
8	10-ms PDL / 40-ms YAG	Developmental

Figure 2: Pulse Group recommendations for Cynergy MultiPlex treatment based on vessels size and type.

Pulse duration [msec]	Measured Purpura threshold (with Cooling) [J/cm ²]
0.5 ms	5.2 ± 2.5 J/cm ²
2.0 ms	7.1 ± 3.0 J/cm ²
6.0 ms	10.9 ± 3.0 J/cm ²
10.0 ms	11.7 ± 3.0 J/cm ²
20.0 ms	13.0 ± 4.0 J/cm ²
40.0 ms	15.0 ± 4.0 J/cm ²

Figure 3: Cynergy PDL Purpuric Threshold with Air-Cooling for skin type II to III patients.

MultiPlex Delay

The next step is to define the delay to be used between MultiPlex wavelengths. Delay is determined by vessel flow rate and volume of blood being treated. Because of the moderate flow of leg veins and the relatively small volume of blood being treated, we have found that a Medium delay affords the best combination of safety and efficacy for these vessels.

Nd:YAG Settings

Finally, the proper Nd:YAG fluence and pulse duration are chosen based on vessel size. We typically employ 50 to 65 J/cm² at 20 to 40 msec to treat deeper, reticular components, and 50 to 60 J/cm² at 15 msec during a second pass to treat remaining superficial telangiectasia. It is best to start at a lower dose, and gauge clinical response, the lowest effective dose is preferred.

Treatment Methods

Prior to treatment, a thin layer of clear, ultrasound gel or K-Y® gel is applied to the area to improve the efficiency of Smart-Cool air cooling. Treatments are generally well tolerated using this method.

As previously mentioned, we typically use a two-level treatment. Using a Veinlight for visualization, we initially treat deep feeding vessels. Typically, treatment results in visible contraction of the deep vessels. In addition, a number of superficial vessels shrink or disappear due to the reduced flow rates of deep treatment. Deep vessels may also darken due to intravascular clot. These are the proper endpoints for deep vessels. If none of these effects occur, the Nd:YAG fluence should be increased in 5 J/cm² increments to a maximum fluence of 70 J/cm².

Once deep vessels have been treated, the MultiPlex settings are changed to the proper fluences and pulsewidths for superficial treatment. Proper treatment results in either intravascular coagulation, vessel darkening that under mild pressure, the vessel can't be blanched or disappeared.

Following treatment, we apply cold packs to reduce any residual swelling or discomfort. Patients are asked to follow standard after care instructions for vein treatment.

Results

We reviewed data from 12 patients treated for leg veins using Cynergy with MultiPlex. All were women between 43 and 66

years of age with skin types II-III. Treated vessels ranged from discrete, blue reticular vessels approximately 2.5 mm in diameter, to superficial red telangiectasia 0.2 mm diameter with and without deep feeder vessels. The technique described above was used in all cases, dual layer treatment dependent on results of examination. Treatments were well tolerated by the subjects.

All subjects exhibited between 75% and 100% vessel clearance in one (33% of subjects) or two (67% of subjects), non-purpuric treatments delivered one month apart (Figures: 1 and 4). No subjects exhibited scarring or other side effects of treatment.



Figure 4: MultiPlex treatment of leg veins: 2.5 reticular vein before (left) and following (right) one treatment.

Conclusions

Proper treatment planning and technique maximize efficacy in the treatment of leg veins with any laser, as does a good understanding of leg vein pathology.

Although conventional single wavelength treatments provided acceptable results in the past, our initial study suggests that, Cynergy MultiPlex treatment provides exceptional outcomes for leg veins using a combination of, previously, sub-therapeutic treatment fluences (in the case of Nd:YAG, approximately ½ the fluence of YAG only treatment).

MultiPlex treatment of leg veins compares favorably to our experience with single-wavelength treatments, setting a new standard for laser treatment of leg veins. The procedure is well tolerated and has a lower rate of complications. This revolutionary technology now allows physicians to treat beyond current laser limitations.

References

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